



IMPERIAL INSTITUTE  
OF  
AGRICULTURAL RESEARCH, PUSA.

DEPARTMENT OF AGRICULTURE  
AND  
TECHNICAL INSTRUCTION FOR IRELAND

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NO. 1.

DEPARTMENT OF AGRICULTURE  
AND  
TECHNICAL INSTRUCTION FOR IRELAND.

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JOURNAL.

Cow Testing and its Advantages—Marketing of Irish Produce—  
Technical Education and Industrial Prosperity—Liquid  
Manure—Peat as a Source of Power—Some Chemical Aspects  
of the Peat Problem—Food Production in Ireland—The State  
of the Crops—Second Fruit Crop Report—Third Egg-laying  
Competition—Estimation of Fat in Milk and Cream—Catch  
Crops—Official Documents—Notes and Memoranda—Statistical  
Tables.

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## NOTICE.

*Communications respecting the literary contents of this JOURNAL  
should be addressed to the Superintendent of the Statistics and  
Intelligence Branch, Department of Agriculture and Technical  
Instruction for Ireland, Upper Merrion Street, Dublin.*

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TECHNICAL INSTRUCTION FOR IRELAND.*

## COW TESTING AND ITS ADVANTAGES.

A number of articles dealing with the value and possibilities of cow testing, and with the need of selecting the best animals for dairy purposes, have been published in this JOURNAL,\* but the subject is of such vital importance to all those engaged in the dairying industry that the matter cannot be over-emphasized.

The average milk yield of Irish cows has been estimated at from 400 to 420 gallons per cow, although records have shown that there are cows in Ireland yielding as much as 1,200 gallons per annum, and, as will be seen from Tables Nos. 1, 1 (a) and 1 (b), it is not uncommon to find—even in the same herd—one cow producing as much milk and butter-fat as two of her companions, all three cows being fed and treated exactly alike.

TABLE NO. 1.

Showing the quantity and value of Milk produced by a herd of Dairy Cows in Ireland during the milking period in 1913.

No. of Cow	Age of Cow	Gallons of Milk produced	Per-centage of fat in Milk	Lbs. of fat in Milk	Value of fat at ls. per lb.	Value of Separated Milk at ld. per gallon (80% of whole Milk)	TOTAL VALUE
	Years				£ s. d.	£ s. d.	£ s. d.
1	9	438	3.92	177.5	8 17 6	1 9 2	10 6 8
2	7	481	3.24	161.0	8 1 0	1 12 0	9 13 0
3	9	424	3.60	157.7	7 17 8	1 8 3	9 5 11
4	8	360	4.09	152.2	7 12 2	1 4 0	8 16 2
5	9	418	3.43	148.1	7 8 1	1 7 10	8 15 11
6	9	379	3.82	149.6	7 9 7	1 5 3	8 14 10
7	3	364	3.85	144.8	7 4 10	1 4 3	8 9 1
8	10	396	3.36	137.5	6 17 6	1 6 4	8 3 10
9	3	373	3.60	138.7	6 18 8	1 4 10	8 3 6
10	3	342	3.92	138.6	6 18 7	1 2 9	8 1 4
11	9	364	3.62	136.1	6 16 1	1 4 3	8 0 4
12	3	309	4.39	140.2	7 0 2	1 0 7	8 0 9
13	3	340	3.59	126.1	6 6 1	1 2 8	7 8 9
14	10	356	3.38	124.3	6 4 4	1 3 8	7 8 0
15	11	373	3.15	121.4	6 1 5	1 4 10	7 6 3
16	15	323	3.60	120.1	6 0 1	1 1 6	7 1 7
17	3	281	4.18	121.3	6 1 4	0 18 8	7 0 0
18	9	325	3.47	116.5	5 16 6	1 1 8	6 18 2
19	13	322	3.36	111.8	5 11 10	1 1 5	6 13 3
20	13	349	3.04	109.6	5 9 7	1 3 3	6 12 10
21	7	270	3.77	105.2	5 5 2	0 18 0	6 3 2
22	6	239	4.04	99.7	4 19 8	0 15 11	5 15 7
23	11	196	3.15	63.7	3 3 8	0 13 1	3 16 9
Average	8	348.8	3.62	132.7	6 12 8	1 3 3	7 15 11

\* See JOURNAL, Vol. viii., No. 4, p. 730; Vol. x., No. 4, p. 722; Vol. xi., No. 4, p. 612; Vol. xii., No. 4, p. 710. See also Department's Leaflet No. 15, "Milk Records."

TABLE No. 1 (a).—Showing the quantity and value of Milk produced by a herd of Dairy Cows in Ireland during the milking period in the year 1914.

No. of Cow	Age of Cow	Date of Calving	Gallons of Milk produced	Per-centage of fat in Milk	Lbs. of fat in Milk	Total No. of days in Milk	Value of fat at ls. per lb.	Value of separated Milk (80% of whole Milk) at 1d. per gallon	TOTAL VALUE
	Years						£ s. d.	£ s. d.	£ s. d.
1	7	24/4/14	808	3.50	292.2	217	14 12 2	2 13 10	17 6 0
2	8	22/2/14	720	3.66	272.3	273	13 12 4	2 8 0	16 0 4
3	7	2/5/14	806	3.14	261.5	210	13 1 6	2 13 8	15 15 2
4	8	15/4/14	669	3.79	262.0	224	13 2 0	2 4 7	15 6 7
5	6	9/3/14	695	3.52	252.8	266	12 12 10	2 6 4	14 19 2
6	6	26/2/14	687	3.50	248.5	245	12 8 6	2 5 9	14 14 3
7	11	25/2/14	638	3.76	247.9	273	12 7 11	2 2 6	14 10 5
8	3	9/4/14	579	3.42	204.6	231	10 4 7	1 18 7	12 3 2
9	5	22/4/14	545	3.45	194.3	217	9 14 4	1 16 4	11 10 8
10	3	1/4/14	530	3.55	194.4	238	9 14 5	1 15 4	11 9 9
11	7	5/3/14	523	3.59	194.0	266	9 14 0	1 14 10	11 8 10
12	3	4/4/14	449	4.01	186.0	238	9 6 0	1 10 0	10 16 0
13	5	16/4/14	447	3.96	182.9	224	9 2 11	1 9 10	10 12 9
14	4	7/3/14	446	3.72	179.1	266	8 19 1	1 11 0	10 10 1
15	3	15/4/14	444	3.83	175.7	224	8 15 8	1 9 7	10 5 3
16	16	1/3/14	456	3.63	171.0	273	8 11 10	1 10 4	10 1 4
17	9	13/3/14	445	3.72	170.9	231	8 10 11	1 9 8	10 0 7
18	3	22/4/14	400	4.00	165.3	217	8 5 4	1 6 8	9 12 0
19	3	5/4/14	420	3.74	162.3	238	8 2 4	1 8 0	9 10 4
20	5	17/4/14	446	3.07	141.5	196	7 1 6	1 9 9	8 11 3
Avg.	6	—	557.6	3.61	207.9	238	10 7 11	1 17 2	12 5 1

TABLE No. 1 (b).—Showing the quantity and value of Milk produced by a herd of Dairy Cows in Ireland during the milking period in the year 1914.

No. of Cow	Age of Cow	Date of Calving	Gallons of Milk produced	Per-centage of fat in Milk	Lbs. of fat in Milk	Total No. of days in Milk	Value of fat at ls. per lb.	Value of separated Milk (80% of whole Milk) at 1d. per gallon	TOTAL VALUE
	Years						£ s. d.	£ s. d.	£ s. d.
1	9	27/4/14	746	3.81	293.7	245	14 13 8	2 9 8	17 3 4
2	8	6/4/14	825	3.06	260.9	266	13 0 11	2 15 0	15 15 11
3	11	15/9/13	645	3.53	235.3	287	11 15 4	2 3 0	13 18 4
4	6	17/5/14	581	3.91	234.7	203	11 14 8	1 18 8	13 13 4
5	7	4/10/13	610	3.68	232.0	266	11 12 0	2 0 8	13 12 8
6	6	1/2/14	644	3.43	228.2	245	11 8 2	2 2 11	13 11 1
7	12	17/12/13	698	2.93	211.3	252	10 11 4	2 6 6	12 17 10
8	11	1/12/13	639	3.17	209.3	301	10 9 4	2 2 7	12 11 11
9	9	25/4/14	549	3.73	211.6	245	10 11 7	1 16 7	12 8 2
10	7	2/4/14	575	3.45	205.0	210	10 5 0	1 18 4	12 3 4
11	6	24/4/14	462	4.28	204.3	238	10 4 4	1 10 9	11 15 1
12	3	27/4/14	468	4.10	198.3	245	9 18 4	1 11 2	11 9 6
13	3	26/4/14	463	3.90	186.6	245	9 6 7	1 10 10	10 17 5
14	7	7/4/14	567	3.41	178.6	231	8 18 7	1 13 9	10 12 4
15	7	23/4/14	476	3.60	177.0	182	8 17 0	1 11 8	10 8 8
16	8	9/4/14	460	3.73	177.3	203	8 17 4	1 10 8	10 8 0
17	6	23/4/14	471	3.59	174.7	210	8 14 8	1 11 4	10 6 0
18	5	27/5/14	501	3.26	168.8	217	8 8 10	1 13 4	10 2 2
19	5	26/4/14	445	3.70	170.1	245	8 10 1	1 9 8	9 19 9
20	6	6/4/14	397	3.75	153.8	203	7 13 10	1 6 5	9 0 3
21	5	12/5/14	407	3.61	151.8	196	7 11 10	1 7 1	8 18 11
22	3	26/5/14	330	3.79	129.2	182	6 9 2	1 2 0	7 11 2
23	3	26/5/14	279	3.62	104.4	182	5 4 5	0 18 7	6 3 0
Avg.	6½	—	529	3.56	194.6	230	9 14 7	1 15 3	11 10 9

Table No. 2 (below) shows what may be done by Irish farmers to improve the milk yield of their herds if cow testing is adopted, and the unprofitable animals disposed of when they are in a saleable condition, the heifer calves from the good cows being retained for dairy purposes.

The farmer, to whose herd the Table relates, tested his cows occasionally up till 1912, when he joined a local Cow Testing Association, and kept complete records, but for a number of years selection and grading have been going on in the herd. At the lowest estimate the average milk yield of the herd has been raised by over 200 gallons per cow in nine years; this increase, valued at even the low price of 4½d. per gallon, would mean an extra return of £3 15s. per cow, and as the farmer in question kept ten cows his income was augmented by £37 10s. per year.

TABLE NO. 2.—Showing what Cow Testing and Selection have done for an Irish farmer.

Year	Milk supplied to creamery per cow *	Average butter-fat test	Lbs. of butter-fat per cow delivered to creamery	Value of butter-fat at 1s. per lb.
	gallons	per cent.		£ s. d.
1902 . . .	339	3.608	124.4	6 6 5
1903 . . .	392	3.563	144.3	7 4 4
1904 . . .	358	3.638	134.6	6 14 7
1905 . . .	351	3.672	133.2	6 13 2
1906 . . .	482	3.610	180.0	9 0 0
1907 . . .	544	3.447	193.8	9 13 10
1908 . . .	492	3.595	182.8	9 2 10
1909 . . .	583	3.579	215.6	10 15 7
1910 . . .	533	3.673	202.3	10 2 4
†1911 . . .	487	3.525	177.4	8 17 5
1912 . . .	538	3.639	202.3	10 2 4
1913 . . .	556	3.784	217.4	10 17 5
1914 . . .	666	3.554	244.6	12 4 7

\* Milk used for calf rearing, household purposes and local sale not included. It is estimated by the owner that this would amount to about 220 gallons per cow per year. The total average yield of the herd for 1913 was 779 gallons per cow, and for 1914 the average yield was 869 gallons per cow.

† This was a dry season, and pastures became very bare during part of the year.

According to the latest returns there are 1,593,092 cows and heifers-in-calf in Ireland, and if, as a result of

What Cow  
Testing  
can do.

cow testing and grading, the average milk yield could be raised by 200 gallons per cow it would mean a total gain to the country of almost £6,000,000 per annum. It must be clearly understood, however, that this desirable result cannot be brought

about in one or two years, as it takes some time to identify the unprofitable animals and fill their places in the herd with young cows of a good milking strain; but when the results obtained in other countries where cow testing has been adopted for a number of years are considered, it will be seen that an increased yield of 200 gallons per cow, or a total average yield of 600 to 620 gallons per cow, is not by any means too high a standard at which to aim.

In one district in Sweden, where milk records have been kept for over ten years, there has been an increased yield of over 200 gallons per cow, and in Holland the average yield from one hundred thousand cows in the province of Friesland has been raised to over 800 gallons per annum. In Denmark, on the island of Funen, where more than forty thousand cows are being tested, the average yield has been raised to over 750 gallons, and results of a like nature are reported from France, United States, Canada, and other countries where milk records are being kept.

In addition to substantial increases in the milk yield, it has been found that in many cases there was a slight improvement in the quality of the milk; increases of from 0.05 per cent. to 0.15 per cent. of fat in the milk having been recorded.

The point may be raised that the majority of Irish cows are Shorthorn crosses—a dual-purpose breed—while most of the cows in the countries mentioned above are pure dairy types, such as the Holstein, Red Danish, Ayrshire, etc. This is quite true, but, as will be seen from Tables Nos. 1 to 5, a large percentage of Irish cows are already yielding much more than 600 gallons of milk per annum, so that if the poor milkers were identified and replaced by heifers bred from cows of a deep milking strain, the average yield could be increased considerably in a few years without much trouble or expense.

Another point which may be raised is that occasionally a cow which is a poor milker produces such good “store stock” that she may be as profitable in the herd as a cow yielding more milk, but not capable of producing quite as good calves for fattening purposes. This also may be true, but it has been found by experience that it is possible to grade up a herd of good dairy cows, the calves from which, when not required for breeding purposes, make excellent store and beef cattle; consequently, Irish farmers should endeavour to build up herds of this type.

While the main object of cow testing and grading up of dairy cattle should be to increase the returns from milk production, there are secondary advantages which must not be lost sight of, and amongst these may be mentioned the enhanced value of dairy

cows with good milk records, and the keen demand which exists on the market for both bull and heifer calves from such cows, for breeding purposes.

In the building up of a dairy herd the importance of mating the cows with a bull of a deep milking pedigree cannot be over-emphasized. If this is not done the best results will not be attained and developments will be slow and uncertain.

Until within the last ten years the records of milk yield systematically kept in Ireland were comparatively few, and mostly confined to the agricultural colleges and owners of pure bred herds. During the past few years, however, the Department's scheme for establishing a register or herd book of Irish dairy cows has led to the keeping of records by a number of farmers.

This scheme came into operation in 1906. The procedure was as follows :—The Department's inspector attended at certain centres and provisionally selected cows which were of good conformation and apparently good milkers. The owners of such selected cows undertook to keep for one year records of the milk yield of each animal. This was done by weighing the milk morning and evening on one particular day of the week throughout the milking period. The Department sent an inspector occasionally to see that the two daily weighings were taken, to check the milk yield, and to take a sample of milk for the determination of butter-fat.

At the end of the year, all cows that yielded at least 500 gallons of milk with a butter-fat percentage of 3·5 were entered on the register. Bulls from such cows sired by pure bred Shorthorn bulls or registered dairy bulls were subsequently inspected, and those which came up to a certain standard were selected as eligible for premiums of £10 per annum.

When this scheme had been in operation for a few years it became clear that the standard of milk yield for cows placed on the register should be raised by at least 100 gallons. Consequently after careful consideration it was decided in 1912 that no cow should be registered unless, according to the records, her yield for one milking period of not more than forty-five weeks had been at least 210 lb. of butter-fat, and that the calculated average percentage of butter-fat did not fall below 3 per cent., nor the calculated yield of milk below 6,000lb.



Having introduced the system in this manner, the Department next proceeded to establish cow testing associations.

**Cow Testing Associations.** They, accordingly, have appointed two instructors in cow testing, who attend meetings of farmers and explain the objects and advantages of keeping milk records, and also the desirability of forming such associations. In order to further encourage this work, provision was made in connection with the scheme for Improvement of Dairy Cattle in Ireland for grants to cow testing associations, which undertook to keep systematic records of both the yield and quality of milk. Under this system a number of farmers living in the same district and desirous of keeping records of the milk yield of all the cows in their herds, join together and form an association, with president, and secretary, or supervisor. The members undertake to weigh the milk from each cow morning and evening on one day each week during the milking period, and, at the same time take a small sample for the determination of butter-fat. The weight of the milk is entered by the farmer on a record sheet, which is sent by him to the supervisor together with the preserved composite samples at the end of the month. The supervisor is responsible for the testing of the milk for butter fat, and for making the necessary entries and calculations that will enable the farmer to know exactly what is the total quantity and money value of the milk produced by each cow in his herd during the month. It is most important that the supervisor should be efficient and have the confidence of the members of the association.

In the majority of cases the associations are formed in connection with creameries, the manager of the creamery being usually appointed supervisor, and paid at the rate of about threepence per cow per monthly test. When an association has been formed, and the Department are satisfied that suitable arrangements have been made to carry out the work of the association, as set forth in Scheme No. 20,\* they supply the association with the necessary record forms free of charge, and also, for at least one year, contribute, at the rate of twopence per cow, per monthly test, towards the cost of testing for butter-fat, provided the members contribute another penny per test, and that satisfactory records for at least 100 cows are kept throughout the year, and that the members are testing all the cows in their herds.

At the end of the milking period, on application being made, the Department are prepared to inspect all cows whose yields of milk and butter-fat have come up to the standard mentioned above, and those which are of good conformation and of well-defined Shorthorn type are placed on the register of dairy cattle.

\* Copies of this Scheme may be had free from Department.

The number of cows on this register at the close of each year since 1907 was as follows :—

YEAR	NUMBER OF COWS			
1907 .. .. .	..	..	..	—
1908 .. .. .	..	..	..	209
1909 .. .. .	..	..	..	288
1910 .. .. .	..	..	..	441
1911 .. .. .	..	..	..	643
1912 .. .. .	..	..	..	884
1913 .. .. .	..	..	..	1,564
1914 .. .. .	..	..	..	2,002
1915 (to date) .. .. .	..	..	..	2,311

The first cow testing association in Ireland was formed in 1909. It consisted of six members with 128 cows, but at the close of that year the numbers had dropped to two members and 47 cows. The other members had discontinued testing owing, it was stated, to the trouble involved in weighing the milk and taking composite samples weekly. No new associations were formed in 1910, but twelve associations, having 85 members and 928 cows, were working during 1911. By the end of 1912 the numbers had increased to 42 associations with 330 members and 3,562 cows. In 1913 there was a further increase, and at the close of 1914 the record for the years 1909-1914 was as follows :—

Year	Number of Associations	Number of Members	Number of cows being tested
1909 . . .	1	2	47
1910 . . .	1	2	47
1911 . . .	12	85	928
1912 . . .	42	330	3,562
1913 . . .	69	485	4,804
1914 . . .	65	484	5,550

It is a noteworthy fact that the most progressive farmers in each district, whose cows are better than the average, are usually the first to join cow testing associations and keep milk records; consequently, the records of yields available at present from cow testing associations cannot be taken as a fair average for all the cows in Ireland.

Tables Nos. 3, 4 and 5 (see pp. 10-11) give particulars of the average yield of milk and butter-fat of a number of cows during the years 1912, 1913 and 1914; also the average yield of the ten best and ten worst cows in each association.

TABLE No. 3.

Showing some results obtained from the working of ten Cow  
Testing Associations in Ireland during the year 1912.

Association No.	MILK			BUTTER-FAT			VALUES { Butter-fat at 1s. per lb. Separated Milk at 1d. per gall. (=80 per cent. of Whole Milk)			
	Average Yield of all cows in Association	Average Yield of ten best cows in Association	Average Yield of ten worst cows in Association	Average Yield of all cows in Association	Average Yield of ten best cows in Association	Average Yield of ten worst cows in Association	Average of all cows in Association	Average of ten best cows in Association	Average of ten worst cows in Association	Difference between average of best and worst cows
	Gall.	Gall.	Gall.	lb.	lb.	lb.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1	382	594	226	135.3	205.8	104.1	8 0 9	12 5 5	6 1 9	6 3 8
2	340	665	304	122.3	231.3	110.4	7 5 0	13 15 7	6 10 8	7 5 0
3	418	663	239	153.1	248.2	86.8	9 0 11	14 12 4	5 2 9	9 9 7
4	386	559	312	142.9	203.8	113.2	8 8 7	12 1 1	6 13 11	5 7 2
5	360	571	259	133.1	207.9	95.2	7 17 1	12 5 11	5 12 5	6 13 6
6	386	652	307	140.8	235.4	116.8	8 6 6	13 18 10	6 17 3	7 1 7
7	643	881	352	235.3	326.5	137.1	13 18 2	19 5 2	8 0 6	11 4 8
8	378	497	275	136.2	190.2	91.5	8 1 4	11 3 3	5 9 10	5 13 5
9	400	522	336	156.7	205.1	123.8	9 3 4	11 19 10	7 6 2	4 13 8
10	475	673	293	185.7	256.1	119.3	10 17 4	15 0 11	6 18 10	8 2 1

TABLE No. 4.

Showing some results obtained from the working of seventeen Cow  
Testing Associations in Ireland during the year 1913.

Association No.	MILK			BUTTER-FAT			VALUES { Butter-fat at 1s. per lb. Separated Milk at 1d. per gall. (=80 per cent. of Whole Milk)			
	Average Yield of all cows in Association	Average Yield of ten best cows in Association	Average Yield of ten worst cows in Association	Average Yield of all cows in Association	Average Yield of ten best cows in Association	Average Yield of ten worst cows in Association	Average of all cows in Association	Average of ten best cows in Association	Average of ten worst cows in Association	Difference between average of best and worst cows
	Gall.	Gall.	Gall.	lb.	lb.	lb.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1	532	760	323	191.2	277.9	119.7	11 6 7	16 8 7	7 1 2	9 7 5
2	459	637	270	167.7	236.3	96.8	9 18 3	13 18 9	5 14 10	8 3 11
3	485	655	343	167.0	227.0	112.8	9 19 4	13 10 8	6 15 8	6 15 0
4	425	619	320	161.0	243.0	116.3	9 9 4	14 4 3	6 17 7	7 6 8
5	510	713	308	191.5	266.2	116.8	11 5 6	15 13 8	6 17 4	8 16 4
6	440	724	282	152.0	263.4	94.2	9 1 4	15 11 8	5 12 11	9 18 9
7	420	512	332	149.9	192.0	114.0	8 17 11	11 6 1	6 16 1	4 10 0
8	485	621	353	176.0	227.0	129.2	10 8 4	13 8 4	7 12 8	5 15 8
9	527	773	350	195.0	297.0	128.0	11 10 1	17 8 6	7 11 4	9 17 2
10	599	775	426	228.0	301.0	162.2	13 7 11	17 12 8	9 10 6	8 2 2
11	377	500	257	136.0	184.0	91.9	8 1 1	10 17 4	5 9 0	6 8 4
12	483	688	353	176.0	242.0	121.0	10 8 2	14 7 10	7 4 6	7 3 4
13	432	553	330	158.0	196.5	119.5	9 6 9	11 13 4	7 1 6	4 11 10
14	645	864	365	234.1	317.4	135.7	13 17 1	18 15 0	8 0 0	10 15 0
15	496	642	362	183.1	233.6	135.7	10 16 1	13 16 4	7 19 9	5 16 7
16	532	729	376	203.1	270.4	148.9	11 18 6	15 19 0	8 13 11	7 5 1
17	532	708	385	188.7	250.5	129.3	11 4 1	14 17 8	7 15 0	7 2 8

TABLE No. 5.

Showing some results obtained from the working of twenty-five Cow Testing Associations in Ireland during the year 1914.

Association No.	MILK			BUTTER-FAT			VALUES {Butter-fat at 1s. per lb. Separated Milk at 1d. per gall. (=80 per cent. of Whole Milk)			
	Average Yield of all cows in Association	Average Yield of ten best cows in Association	Average Yield of ten worst cows in Association	Average Yield of all cows in Association	Average Yield of ten best cows in Association	Average Yield of ten worst cows in Association	Average of all cows in Association	Average of ten best cows in Association	Average of ten worst cows in Association	Difference between average of best and worst cows
1	Gall. 437	Gall. 606	Gall. 344	lb. 164.3	lb. 231.3	lb. 126.5	£ s. d. 9 13 4	£ s. d. 13 11 8	£ s. d. 7 9 5	£ s. d. 6 2 3
2	510	752	323	183.8	279.7	112.7	10 17 10	16 9 9	6 14 2	9 15 7
3	418	599	260	153.0	216.0	99.5	9 0 10	12 15 11	5 16 10	6 19 1
4	455	607	402	166.0	231.0	135.0	9 16 4	13 11 5	8 1 9	5 9 8
5	537	780	337	204.0	318.5	132.4	11 19 9	18 10 6	7 14 10	10 15 8
6	527	776	387	183.0	266.6	135.3	10 18 1	15 18 3	8 1 1	7 17 2
7	427	596	337	160.4	229.2	120.4	9 8 9	13 8 11	7 2 9	6 6 2
8	498	666	347	170.5	231.0	122.0	10 3 8	13 15 4	7 5 1	6 10 3
9	438	550	324	158.0	203.2	121.0	9 7 2	11 19 10	7 2 7	4 17 3
10	520	733	402	184.0	255.1	136.0	10 18 8	15 4 9	8 2 9	7 2 0
11	578	722	441	208.0	266.3	144.6	12 6 6	15 14 4	8 13 11	7 0 5
12	581	827	355	217.8	341.3	129.0	12 16 6	19 16 4	7 12 8	12 3 8
13	568	664	404	203.0	243.9	147.7	12 0 10	14 8 2	8 14 7	5 13 7
14	480	614	346	183.5	229.2	127.0	10 15 6	13 10 1	7 10 0	6 0 1
15	403	556	297	145.7	189.9	105.5	8 12 6	11 6 11	6 5 3	5 1 8
16	404	714	265	147.2	270.6	97.4	8 14 1	15 18 2	5 15 1	10 3 1
17	572	759	298	197.8	302.9	114.3	11 15 11	17 13 5	6 14 2	10 19 3
18	530	676	383	185.2	237.4	133.0	11 0 6	14 2 5	7 18 6	6 3 11
19	615	835	384	222.1	293.7	141.9	13 3 1	17 9 4	8 7 6	9 1 10
20	428	680	278	157.9	240.5	104.7	9 6 4	14 5 10	6 8 2	8 2 8
21	485	666	315	176.0	242.0	113.0	10 8 4	14 6 4	6 14 0	7 12 4
22	577	785	437	209.3	237.4	163.2	12 7 8	16 19 9	9 12 4	7 7 5
23	548	714	360	209.6	276.4	136.3	12 6 1	16 4 0	8 0 4	8 3 8
24	478	654	294	170.8	234.4	113.3	10 2 8	13 17 11	6 12 11	7 5 0
25	394	538	271	142.4	195.0	95.6	8 8 8	11 10 10	5 13 7	5 17 3

As will be seen from Table No. 6, which is a summary of Tables 3, 4 and 5, the average yield of the ten best cows in each association is approximately double the average yield of the ten worst cows, indicating that there are many cows, even amongst the best of these herds, which are not paying for their keep.

TABLE NO. 6.—COW TESTING.

*Summary, 1912.*

	Milk in gallons	Per cent. fat in milk	Butter- fat in lbs.	VALUE Butter-fat at 1s. per lb. Separated milk at 1d. per gallon (80 per cent. of whole milk)
True average yield of 751 cows .	430	3.58	159	£ s. d. 9 7 8
True average yield of 100 best cows	627	3.57	231	13 12 9
True average yield of 100 worst cows	294	3.58	109	6 8 7
Difference between average of best cows and average of worst cows	333	—	—	7 4 2
Difference between average of worst cows and average of all cows .	136	—	—	2 19 1

*Summary, 1913.*

	Milk in gallons	Per cent. butter- fat in milk	Butter- fat in lbs.	VALUE Butter-fat at 1s. per lb. Separated milk at 1d. per gallon (80 per cent. of whole milk)
True average yield of 955 cows .	505	3.55	185	10 18 8
True average yield of 170 best cows	671	3.58	248	14 12 8
True average yield of 170 worst cows	337	3.50	122	7 4 5
Difference between average of best cows and average of worst cows	334	.08	126	7 8 3
Difference between average of worst cows and average of all cows .	168	.05	63	3 14 3

*Summary, 1914.*

	Milk in gallons	Per cent. fat in milk	Butter- fat in lbs.	VALUE OF YIELD Butter-fat at 1s. per lb. Separated milk at 1d. per gallon (80 per cent. of whole milk)
True average yield of 1,739 cows .	483	3.60	179.6	10 11 9
True average yield of 250 best cows	682	3.58	252.5	14 17 11
True average yield of 250 worst cows	343	3.51	124.3	7 7 2
Difference between average of best cows and average of worst cows .	339	0.7	128.2	7 10 9
Difference between average of worst cows and average of all cows .	140	.09	55.3	3 4 7

The desirability of identifying and weeding out the poor milkers will be very evident when it is considered that it practically costs the same to keep a poor milch cow as a good one, although there may be a difference of as much as £8 to £10 per annum between the value of the milk produced by the two animals, so that one cow is a source of considerable loss to the farmer while the other shows a good profit. When comparing the profits derived from

individual cows, it is most important to remember that it is not the total returns from each cow that should be compared, but the net amount after the cost of "keep" has been deducted. A herd may consist of four cows producing milk, calf, etc., value £18, £14, £10 and £8 respectively, and if it costs (say) £10 per year to keep a cow, then one cow would be making a profit of £8, another £4, while the third cow would be paying for her food only, and the fourth cow showing a loss of £2.

It is sometimes given as an excuse for not joining cow testing associations and keeping milk records that the  
**The Need and** good and bad cows in a herd are known already,  
**Use of Cow** and that it would be only a waste of money  
**Testing.** and time to provide the necessary outfit, and go to the trouble of weighing the milk and taking the composite samples weekly. Experience has shown, however, that it is almost impossible for the most careful milker to estimate even approximately the milk yield of any cow in a herd, and it is frequently found—when milk records are kept—that there is a difference of as much as 100 gallons per annum between the yields of two cows which were considered equally good milkers by the owner. When this is the case with regard to the quantity of milk, it will be easily understood that the question of quality is much more difficult to decide by observation, as one cow which is considered "very good" may produce a large amount of milk with a low butter-fat test, while another cow producing less, but richer milk, may be the more profitable animal, and this difference can only be ascertained by keeping systematic milk records.

The difficulty of procuring labour on the farm is also given as an excuse for not testing cows, but when it is considered that weighing the milk and taking composite samples for a herd of ten or twelve cows would not occupy the time of one person for more than about twenty minutes per week, it will be seen that the advantages derived from cow testing more than compensate for any little trouble involved in keeping the records, especially as the work can generally be carried out by the person who milks the animals.

The cost of apparatus for weighing the milk and taking composite samples at the farm is so small that it should not prevent any cow owner from keeping records, more especially as the spring balance can be used for other purposes than cow testing, such as weighing parcels, etc., and with ordinary care should keep in good working order for at least ten years. The total cost under this head for a herd of twelve to fifteen cows would not be more than about one shilling per cow.

The appliances, etc., required by the supervisor of a cow testing association, for testing the composite samples for butter-fat, are more elaborate and expensive, but as the associations are usually worked in connection with creameries, the creamery appliances are available free of charge. Of course, if an association is formed independent of a creamery, then the members must provide the testing appliances, etc., required by the supervisor. These may cost from £10 to £15.

The following is a list of apparatus for the weighing, sampling Apparatus. and testing of milk in connection with cow Required. testing associations :—

*For each member :—*

1. A circular spring balance to weigh 40 lb., with one revolution of the indicator, and marked to show half-pounds ; indicator to be adjustable.
2. Sample bottles of 5 oz. capacity, with ground glass stoppers ; each bottle to have a roughened space  $1\frac{1}{4}$ " by  $\frac{3}{4}$ " on the front on which may be entered the number or name of the cow from which the milk samples are obtained.
3. A sample dipper, capacity half-ounce.
4. Preservative pellets and scme No. 8 shot.
5. A suitable box for holding the sample bottles.

*For each association :—*

1. A crank-driven centrifuge of latest improved pattern for 24 bottles, with free-wheel action and speed indicator and strong iron casing.
2. Thirty accurate test bottles, with screwed necks and rubber corks complete, and wooden stand to hold 24 bottles, the former numbered consecutively by means of small brass or aluminium labels twisted round the necks, and the latter by numbered enamelled strips fixed on the top of rack between the two rows of test bottles. (There should be no duplicate numbers, which are a common cause of confusion and error.)
3. A hot water bath, of copper or enamelled iron, for 24 test bottles ; bath to be supported on an iron stand and provided with overflow pipe and draw-off tap.
4. A No. 4 Primus paraffin lamp, a paraffin oil stove, or a large spirit lamp, to heat water in bath referred to at 3.
5. One 1 c.c. and one 10 c.c. pipettes, and three 11 c.c. pipettes for milk.
6. One 250 c.c. burette for sulphuric acid, reading 10 c.c. ; and one 50 c.c. burette for amyl alcohol, reading 1 c.c. (with stands complete).

7. A supply of preservative pellets.
8. Seven pounds of No. 8 shot for mixing samples and cleaning out bottles.
9. Fourteen pounds of washing soda or some good cleansing powder.
10. A set of suitable brushes for cleaning test bottles.
11. Four Winchester quarts of sulphuric acid, density 1.825 at 15° C., and 2 lb. of amyl alcohol, free from fat and with a density of .815 to .816 at 15° C.
12. A reliable chemical thermometer about 10 inches in length.

Under the Department's Scheme No. 20, "For Encouraging Improvement in the Dairy Cattle of Ireland," the members of cow testing associations pay a much smaller proportion of the supervisor's remuneration than is the case in most other countries where milk records are kept. In Denmark the farmers pay (approximately) three-fourths of the cost of testing the milk, and the Government the other one-fourth, while in Ireland the Department pay two-thirds of this cost, and the cow owners one-third.

The system of working cow testing associations in Denmark and some other countries is different from that practised in Ireland, inasmuch as under the Danish system it is usual to appoint a whole-time supervisor—or tester—to each association, and this man travels from one farm to another. The farmer has to board and lodge him, and drive him and his set of instruments to the next farm. The supervisor visits each member about once a fortnight, and weighs the milk of each cow both evening and morning. At the same time samples are taken and tested for butter-fat, and the necessary entries and calculations made. A record is also kept of the cost of feeding the cows. Arrangements are made for the farmer to weigh the milk during the intervening week.

The appointment of a whole-time supervisor can be strongly recommended provided the herds are large (see Scheme No. 20), but it would not be suitable in the case of associations where the herds are small and scattered over a wide area.

Every owner of dairy cows is strongly advised to join a cow testing association, or, if there is no association in his district, to help where practicable to form such an association. Cow testing associations enable their members not only to ascertain the quantity, but also the quality of the milk yielded by each of their cows, and thus make it possible to determine which cows are worth retaining in a herd and which should be discarded.

These associations are solely responsible for the correctness of the records kept by their members. In this connection it should be borne in mind that the value of a herd with records or of a young bull from a registered cow will depend mainly on the degree



of confidence which other farmers place in the breeder's figures. This fact should induce farmers to bestow special care on the keeping of their milk records.

No farmer should join a cow testing association, or enter his cows for testing unless he is prepared to carry out the work consistently, and to make an effort to interest others in the work of the association.

It is most important that cow testing should not be discontinued after one season, as there are usually both young and old cows in the herd, the yields of which would vary from year to year. Consequently, the records of one year would not hold good for the following season. Continuous testing also enables a farmer to note the increased returns when any extra food, such as cake or green crops, is fed to the cows.

In most countries where milk records are being kept an attempt is made to keep an account of the quantity and value of food consumed by the animals, so that a farmer may decide as to the most profitable system of feeding his dairy cows. At one farm in Scotland it was found that the milk was costing—for food alone—4·97*d.* per gallon, while at a neighbouring farm the cost under this head only amounted to 2·59*d.* per gallon, or a difference of 2·38*d.* per gallon in favour of economic feeding.

#### SUMMARY.

1. Numbers of cows in Ireland are not producing milk enough to pay for their keep. In some cases the yield is less than 300 gallons per cow, the average yield being about 420 gallons per cow per annum.

2. Many Irish dairy cows are yielding from 600 to 800 gallons of milk per annum.

3. Even in the same herd, one cow may produce as much milk and butter-fat as two of her companions—the three cows being fed and treated exactly alike.

4. It is possible to raise the average milk yield of Irish cows by at least 200 gallons per cow, if the poor milkers are identified and replaced by the progeny of the profitable animals.

5. If the average milk yield of all the cows in Ireland were increased by 200 gallons it would mean an extra income to the country of almost £6,000,000 per year.

6. By joining a cow testing association a farmer can have his cows tested with the minimum of trouble and expense.

7. In the grading up of a dairy herd it is most important to mate the cows with a bull of deep milking pedigree.

8. By grading up a herd of dairy cows the farmer not only increases his annual income, but also increases the amount of capital invested in the herd, and raises the reputation of Irish dairy cattle.

## THE MARKETING OF IRISH PRODUCE.

The old idea tenable half a century ago, that any package would do for marketing produce must be abandoned in these days of quick transit and cold storage, when we have to compete with colonial and continental rivals who place their goods on the market in an attractive manner, and now we must rouse ourselves and study present-day requirements.

Whilst economy is good at all times, it has become a necessity to the individual and to the nation at large during the last twelve months for reasons which are well known to all. Most of the appeals in this respect have been made to the consumer, and it has been stated that the producer has not the same need for economy, owing to the exceptionally good prices that have been realised during the present crisis for all kinds of agricultural produce. Admitting that good prices have been obtained, this is due more largely to the shortage of foreign supplies than to any general improvement in the out-turn or packing of the produce, and, because, owing to the shortage named above, the buyers in Great Britain could not afford to be so particular in the selection of their goods.

The packing and handling of all produce must, however, be carefully done, and we all ought to realise that whether it be eggs, butter, poultry, cheese, fruit, honey, etc., honesty and accuracy in every detail are most essential to ensure the good results.

Let us consider for a moment the care other countries take to place their goods, even though of small value, on the market. For instance, oranges this year have been selling wholesale as low as 6s. 6d. per box containing 714. These oranges are each wrapped separately in tissue paper. The box is divided into sections. The outside of each box is nailed and also bound with rope or rough hide. Again, take Spanish onions which only usually realise about 5s. or 6s. per box, similar care is shown here in the packing and grading, and the attractiveness of the package when opened helps greatly to sell the contents. To come nearer home, who would think of buying a dirty collar or soiled handkerchief at any price? Contrast this with many of our cases of eggs which are worth at present many times as much as the cases  
**Packing of Eggs.** of oranges or onions and see the carelessness that is displayed in the packing.

Many improvements have been made in the style of packing during recent years and the general adoption of hand packing or the use of the Lyons' tray is to be strongly recommended in preference to the common method of packing with the wicker skib. The Raylite fittings are being used more largely, but the difficulty appears to be in getting the cases returned, as shippers maintain

that the fitting is too expensive to be non-returnable, i.e., to allow for one journey only.

The ordinary Canadian box with fillers is in almost general use by some of the principal shippers in the North, and, on the whole, gives satisfaction, provided that the eggs are closely graded.

It is regrettable to notice that shippers of eggs from certain districts, especially from the West of Ireland, have not made the desired improvement in their packing during recent years, and have not been so alive to this important item as the shippers in other districts. Such eggs from the West of Ireland often arrive in Great Britain with a breakage of 5 per cent. and over, 30 eggs broken in a case of 6 hhd. is often on the low side, whereas the experimental shipments carried out by the Department some time ago clearly proved that if eggs are properly graded and properly packed in the cases recommended by the Department, the breakages need not exceed 2 per hundred, if the cases are handled with reasonable care in transit.

Whilst admitting that perhaps the transit companies are not wholly blameless in the matter, it must be remembered that their difficulties have been increased during the past year owing to their regular staff having been depleted in answering the call to serve their country and owing to the requirements of military transport.

The average shipper from the West of Ireland might state that he sells all his goods f.o.r., and therefore is not

**The Need of careful Packing.** penalised by careless packing, but such is not the case, as merchants in Great Britain usually reckon that eggs from the better shippers in the North, and also certain districts in the South of Ireland are worth 8d. to 1s. per hhd. more than a similar class and weight of egg from the West of Ireland; part of this decreased amount they reckon as an assurance against breakage, indifferent packing, the use of bad straw, and a slight difference due to extra freight. It clearly proves that the shippers in these districts are not paying the producers what they really deserve, and if these shippers generally would carry out the instructions as set out in the leaflets issued by the Department, the saving to the country would amount to thousands of pounds annually.

It is wrong to think that it does not pay to use the most suitable cases on account of expense, and we rarely hear the leading shippers complain of the cost of the package and packing material, and the very shippers who should use the best packages to neutralise the trade disadvantages from which they suffer, such as distance to be carted to railway station, and then, perhaps, several transfers during shipment, are invariably the shippers who use badly made cases and pay little attention to packing.

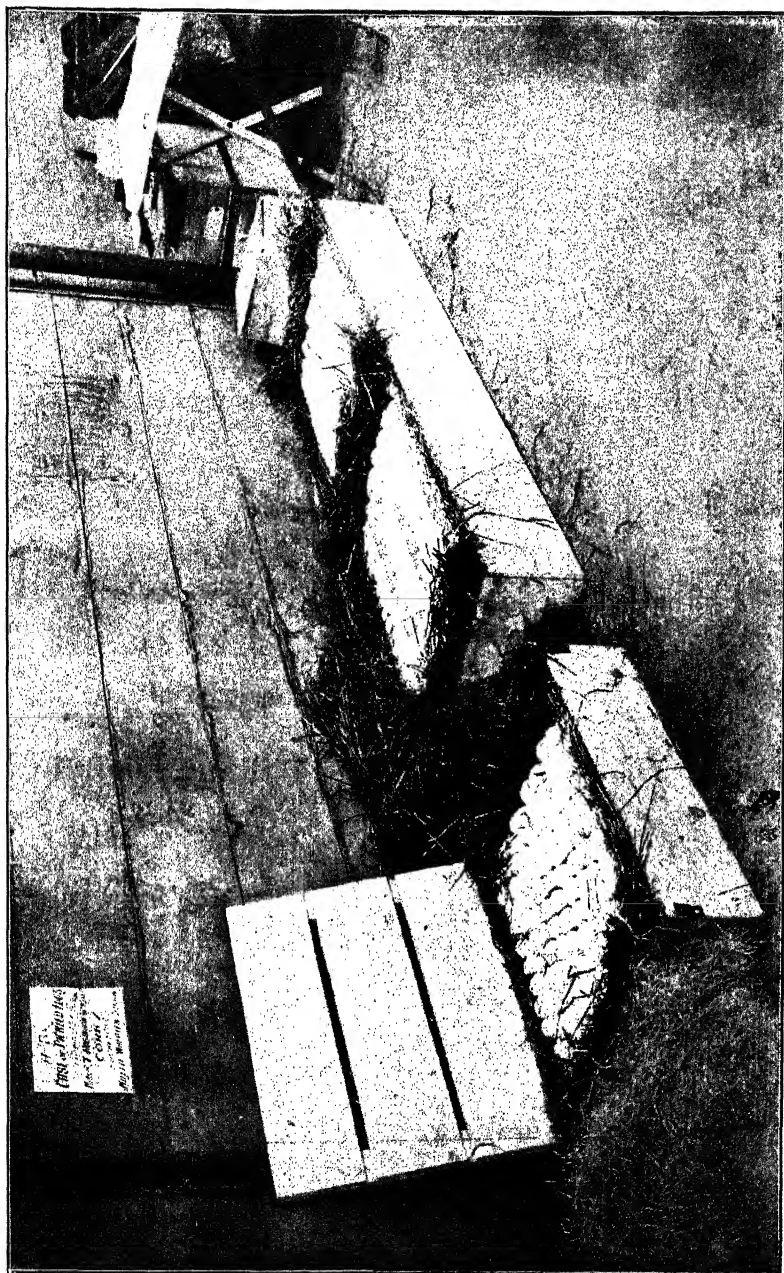


Fig. 1.—A case of 300 glycerined pickled eggs from Cork, packed in milled wheat straw, well packed in every respect.  
A one-division case of 1,200, making, if cut through centre, 2 X 600 cases, well packed in every respect in milled wheat straw

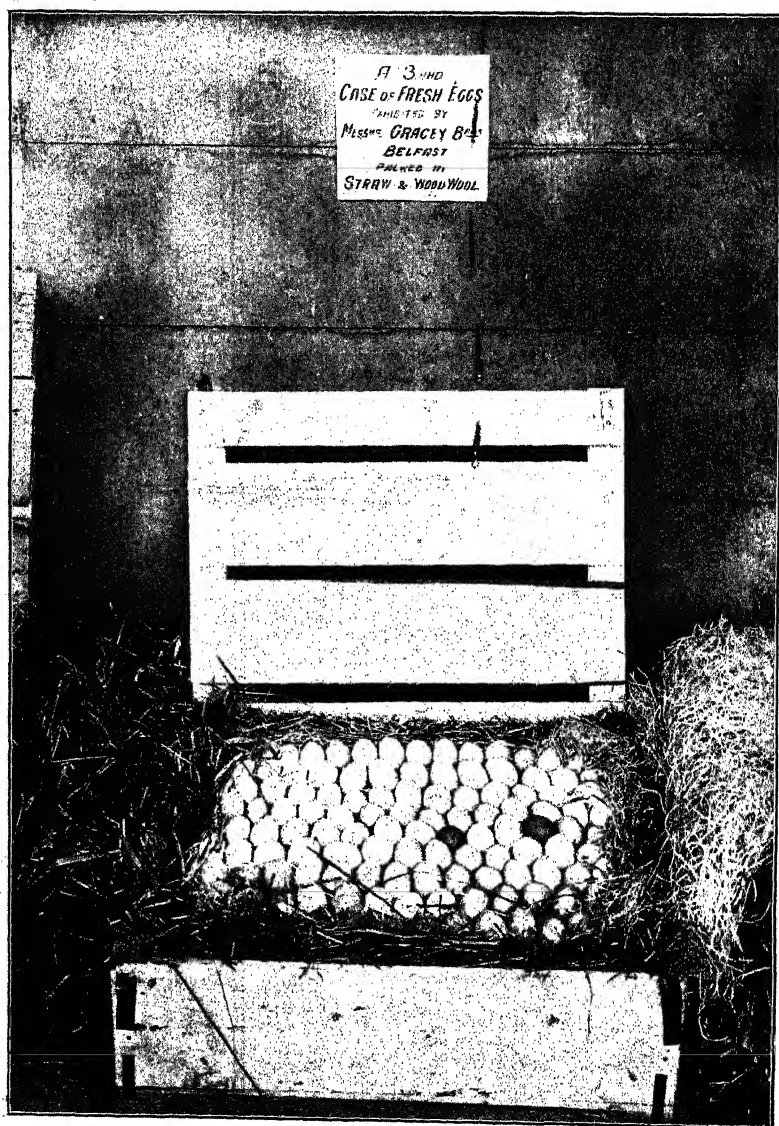


Fig. 2.—Case of very fine, all brown eggs. Clean case of white wood. Eggs very even, all clean. Well packed with dry bright straw and non-resinous wood-wool. Not an egg broken.



Fig. 3.—Two boxes bought in Dublin. The box on the left was made of wet unseasoned wood; the one on the right was a re-used box. Many of the eggs were dirty, they were not placed, but lay all ways, some were broken. All grades were mixed up, and duck eggs were included. The packing material was mixed—hay and straw, dirty, damp, and fusty. The eggs as to the bulk were of good



Fig. 4.—A non-returnable case of 18 turkeys, graded 10 to 12 lbs., packed in straw on bottom of case, and grease-proof paper under and at sides of each bird.



Great improvements in butter packing have been made in recent years and the results of the Surprise Inspections of the Department have tended towards a better understanding between producers and buyers and opened many new markets. Many creameries, however, are still lacking in that uniformity of quality of goods and attention to marketing details which is essential. When the highest price at date of sale is not received, managers of creameries should examine their manufacturing and business methods, and they would frequently find that there is room for improvement and that it is often "the thing one leaves undone" that causes all the trouble. As butter is one of the most valuable table commodities, it ought not to be asking, indeed demanding, too much from the creameries that the contents of the kegs or boxes should be of the correct weight, perfect colour, flavour and texture, and that the package should be turned out in a manner creditable to the producer.

The Poultry trade is still far from being on a satisfactory basis and the amount of money lost to the country every year by downright carelessness is appalling. Numbers of shippers still persist in using dirty and unsuitable packages, such as empty soap or candle boxes, tea chests, cardboard bonnet boxes, match cases, etc., for the despatch of poultry to British markets. Food of such a perishable and delicate nature cannot be expected to arrive in the best condition if it is so treated.

That Ireland has to import such an amount of small fruit such as currants and raspberries for preserve makers shows a lack of interest on the part of the fruit growers. Moreover, there is not much inducement in many cases for buyers to patronise the home producers when the latter will not take the proper care to place their goods on the market in a suitable condition. Nature does her share in bringing the fruit to maturity, and although growers may tend the fruit in its early stages, all the good derived therefrom is lost through careless and indifferent handling when placing on the market. There is a splendid opportunity to increase the quantities of wild fruit exported to Great Britain owing to the absence of supplies from Germany, and the difficulties in transit from the continent, and Ireland ought to benefit greatly, but shippers must bear in mind that wild fruit, such as bilberries and blackberries must be shipped on the same day as that on which it is gathered, the fruit clean and free from all leaves, and shipped in suitable packages which the buyers demand. The Department endeavour to advise shippers the best means to pursue to secure full



value for their produce, but even where careless shippers do improve their methods, they cannot expect to receive the best or top prices immediately, as buyers will require to know and be impressed that the improvement is permanent.

Shippers should pay special attention to their business corres-

<b>Business</b>	pondence at all times, but this perhaps is even
<b>Methods.</b>	more necessary at the present time owing to
	delays in transit, and this embraces :—

- (1) acceptance of orders ;
- (2) advising consignees daily of all shipments, by post card, in addition to invoice or pro-forma invoice ;
- (3) replying to all genuine inquiries at once ;
- (4) strict attention to forwarding instructions, i.e., advice of route and proper labelling ;
- (5) furnishing receipts to customers when accounts are paid.

1. If you accept an order and then find you can only partly execute it, advise your buyer immediately.

2. Always advise the consignee the day on which you despatch the goods, stating the route by which they are forwarded, and let not his first advice be the one which he receives

**Some Hints.** from the carrying company. By advising consignee, it often enables him to sell the goods in advance and thus get a better market than he would by waiting until the goods actually arrived. In business these days, buyers like to buy ahead, provided they know the quality and quantity of the goods coming forward, so on no account forget to advise each consignment.

3. If any prospective buyer, not the usual touter, writes to you for a quotation for any article even if you have no goods to offer, common courtesy requires an answer, and a half-penny card will suffice. A producer is in a totally different position to a buyer, and cannot act so independently, and he should remember the old adage that "the man who pays the piper has the right to choose the tune." Every order ought to be acknowledged, and if delivery cannot be given as requested, *advise your buyer immediately*, as civility costs very little and it eases the wheels wonderfully and keeps you on good terms with your customer.

4. Pay special attention to any forwarding instructions which you may receive, and if you receive an order for a large quantity of goods—eggs, or whatever the produce may be—do not ship from different stations or in part lots on different days, as this incurs extra charges and is annoying to buyers.

5. When you receive payment from buyers for goods supplied,



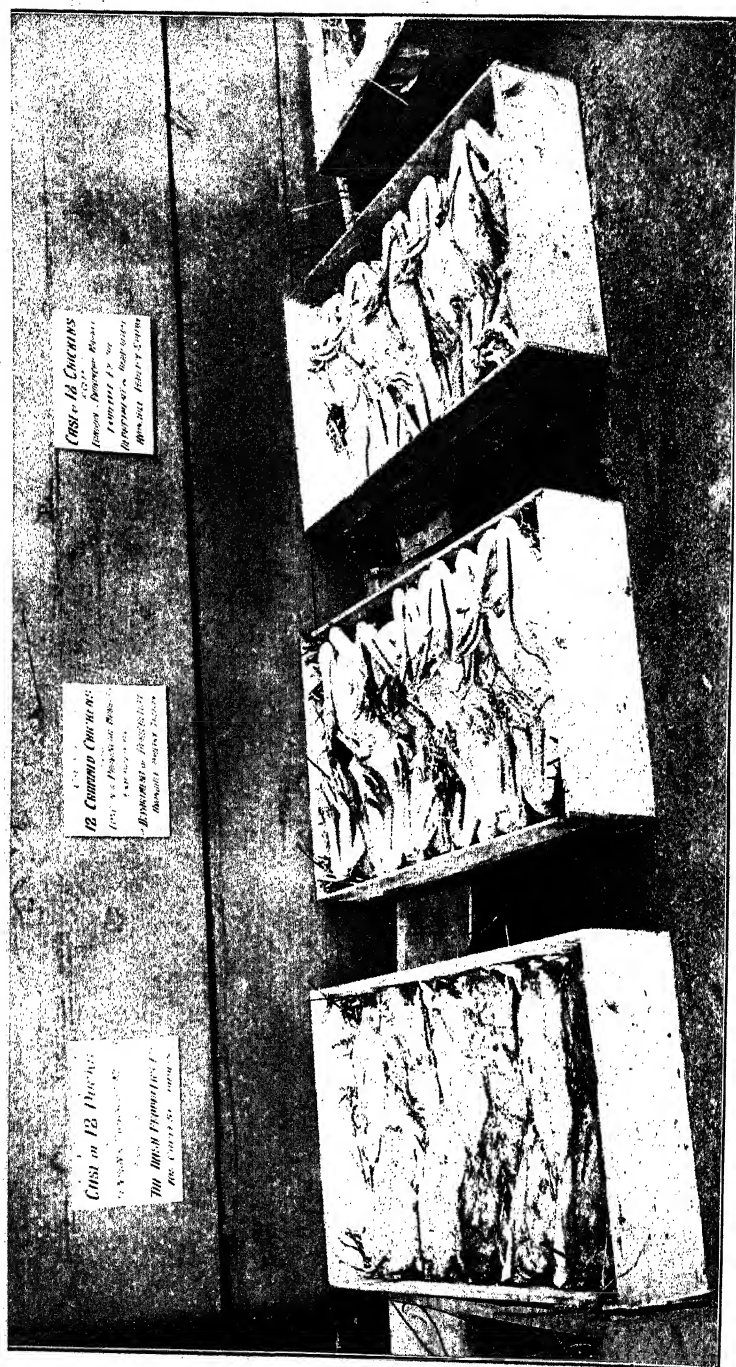


Fig. 6.—Three one-dozen non-returnable boxes filled with one dozen ducks, one dozen crammed chickens, and one dozen lean chickens. Packed thus:—Clean drawn dry straw on bottom of case, clean white paper, birds laid in and out, viz., head and tail, tail and head—another piece of paper folded and placed over each head and neck and under each body. When closing the case more paper would be put over birds, a little straw on top.

NOTE.—All breasts are turned up, every bird can be seen, they are graded, all being within  $\frac{1}{4}$  lb. of each other.

do not overlook the fact that you ought to furnish a receipt. Buyers repeatedly complain that it is almost impossible to get a receipt.

There has certainly been a desire on the part of British manufacturers to enquire as to the best methods to adopt to capture German trade, and if our producers and shippers of agricultural produce could be roused to a sense of their duty in this matter, and see the openings they have for displacing the foreign articles, this terrible war will not have been wholly without a set off. It is admitted that improvements have been made in recent years, but progress is very slow and too many are inclined to sit with folded hands and be contented with things as they are.

Thus we see that because obvious remedies remain unadopted the public are deprived of important articles of consumption, prices of many kinds are in the best classes enhanced, and the food of the middle-classes rendered less wholesome and less nutritious. The general adoption of better packages with more careful packing would naturally lead, by the advantages made manifest in their use, to a wider and more pressing demand. It may be taken as a trade axiom that as all business done at a loss tends to extinguish itself, so all business done under reasonable hope of profit tends to expand in area and increase in volume.

Moreover, by this extra attention to detail the Irish producers and merchants have an opportunity of establishing their goods on the British market which may not occur again for a long time. Moreover, once a satisfactory reputation is established it makes it doubly hard for any foreign competitor to displace them.

To-day, success means supplying the want of to-morrow, and we have had this idea emphasized very often during recent times. It is not only the long-felt want it pays to look after, but also the unborn ones.

It is the man who has imagination, who can look ahead and see what the world will want to-morrow and the next day, that wins. And after all, when you notice it, that is the secret in business, in politics, in fact in everything—to have that understanding of men which comes of sympathy and of fellow-feeling which makes one feel their real needs; and, in addition, that constructive imagination that anticipates the wants that are to come.

## TECHNICAL EDUCATION AND INDUSTRIAL PROSPERITY.

*Excerpt from an Address at the Prize-giving of the Kingstown Municipal Technical School on 12th October, 1915, by GEORGE FLETCHER, F.G.S., M.R.I.A., Assistant Secretary in respect of Technical Instruction.*

During the last fifteen years Technical Education has made enormous strides in this country. The urgency of its claims have been again and again impressed upon the people, and the appeals have met with a ready response, but there never was a time when these claims have been so urgent as at present. We meet under the shadow of a devastating war. When this sanguinary conflict is brought to a successful ending it will be followed by a struggle of a different kind—bloodless but none the less strenuous. This struggle, a struggle for commercial and industrial supremacy is, it is true, always going on, but under the circumstances into which we have been forced its intensity will be enormously increased. Consider for a moment our economic position. A large proportion of the productive effort of the United Kingdom has been checked and deflected into the service of war. For this and other reasons many of our industries are temporarily retarded and our exports greatly reduced. At the same time our imports have greatly increased, and to pay for these vast sums of money must leave the country. It is of the utmost importance that the volume and value of these imports should be reduced as far as possible. How is this to be done?

### THE NEED OF INCREASED HOME PRODUCTION.

It is clear that it can only be done in two ways: Firstly, by producing in the country as much as possible of those things we need, and secondly, by using every effort to economise in every reasonable direction. This stimulation of production is a matter of vital importance, which, though important at the present moment will become a question of first rate magnitude at the end of the war. It is a problem vitally related to the question of technical instruction, which seeks above all things to train the executive powers of the workers of the country. I need not dwell on the close connection between science and the conduct of the war. It has been called "the Engineer's War," and it is certain that science and the applications of science constitute a most important factor in it. Very many young Irishmen that I could name who have received

their scientific training in Irish Technical institutions have gone to devote their scientific knowledge in unexpected directions to the service of their country. We also realise more clearly than before how dependent our industries are upon scientific investigation and discovery. You will remember, for example, how many industries were menaced by the fact that we might no longer import our artificial dyes from Germany. Before the outbreak of war, the United Kingdom was consuming something like two million pounds' worth of dyes per annum—one-tenth of which we produced in these Islands. These two million pounds' worth of dyes are essential to a number of textile and other industries worth over 200 millions a year, and on which a million and a half of workmen were dependent. In 1913 over one and a half million pounds' worth of these dyes was imported from Germany. We have never failed to urge that more strenuous and more systematic efforts should be made to capture a large portion at all events of this trade and manufacture these dyes at home. But since the outbreak of war, the question, as I have explained, has assumed a much more pressing form, and the Government, realising the importance of the matter, took exceptional steps to supply the pressing need. It is to be hoped that when peace is restored we shall have been able to overcome all the difficulties with which the problem is surrounded, and that we shall attain in the manufacture of aniline dyes and drugs the pre-eminence that we enjoy in many other industries. It would be possible to multiply examples of a like character, and these when analysed nearly all resolve themselves into the question of scientific training and efficient production. We must, all of us, in the future, be more scientific and efficient in our work, whatever this may be.

I would remind you that before the outbreak of war we were importing into the United Kingdom from Germany something like nineteen million pounds' worth of manufactures more than we were exporting to that country. Moreover, Germany was exporting to our overseas dominions and foreign countries outside Europe something like eighty million pounds' worth of manufactured goods. We must, by means of our manufactures, produce within the Empire much more of the things which we previously imported from Germany. The question will naturally arise, and should arise with us here: How can Ireland profit by the stimulus that must be given to British industries? My own view is that this is a matter we can determine for ourselves. I think that the first thing to do is to put aside the opinion that Ireland is a purely agricultural country. I am aware that agriculture is, and must remain, our staple industry, and that at the present time, and indeed at all times, its interests are vital to us. The Department have during the last few weeks been leading a campaign intended to encourage our

farmers to increase tillage and thus to increase our food supplies, and to that extent reduce our imports for which we have to pay. But the encouragement of our manufacturing industries is in no sense inimical to agriculture. On the contrary I believe that the prosperous country town is an essential to a prosperous countryside.

#### IRISH INDUSTRIES MUST BE DEVELOPED.

There would be no difficulty in demonstrating what indeed many of you know, namely, that Irish industries have made remarkable progress in recent years, and what we have to do is to accelerate this progress. We must get away from the notion that the development of Irish industries involves industrial conditions such as characterise the industries of the huge populous centres of Lancashire and Yorkshire—conditions so repugnant to many people I have met. The opportunities we possess for the development of small factory industries have been strongly advocated, and I am more than ever convinced that they contain great promise of success. It is inevitable that in the work of development which lies before us technical education must take a foremost position.

#### THE NEED OF ECONOMY.

But not only is it necessary to increase our production we must also strain every nerve to economise. It is impossible to avoid the conclusion that in the coming years life will be much more strenuous and that it will be necessary to make the most of what we have. It is not only important that our farmers should produce more food-stuffs, but that we should know how to use them, that we should avoid every form of waste and that we should stimulate that branch of our scheme of technical education we call Domestic Economy, which deals with the home, with the preparation of food, and indeed with all those practical things that concern the right and economical management of a household. We must realise more and more that the prosperity of a home, like the prosperity of the nation, does not depend alone upon revenue, but it is to be expressed by the ratio between the income and the expenditure. The cultivation of thrift, then, becomes a most essential question in our Domestic Economy classes.

May I say a further word in reference to our duty in this matter, and here my remarks are mainly directed to the present and future students of the Technical School. I am reminded that when I had the pleasure of speaking at your Prize Distribution in 1912, I called your attention to the fact that the Germans believed so strongly in technical education, that it had been made compulsory, and I do not doubt that this measure of compulsion has been justified by

results. We are in this country lovers of liberty, and our system of technical education is entirely voluntary in character. But this liberty carries with it serious responsibilities, and if we are to continue to enjoy our liberty we must fight for it and work for it. If we are not to be most seriously handicapped in competition with a nation in which compulsion exists, we must exercise that responsibility which is a condition of our freedom, and this means that all our young men and women should seek to develop to the utmost the powers with which God has endowed them, and in seeking to realise this they will find the technical schools of the country prepared to give them most valuable assistance. Indeed, larger and steadier attendance at our technical schools will afford the Committees wider opportunities and means for adapting their schemes to the needs of those attending the schools.



## LIQUID MANURE.

In all parts of this country there is a considerable waste of liquid manure from byres, stalls and piggeries, as well as of drainage from the manure heap. If it were possible to get the greater portion of this applied to the land it would result in an enormous increase in crop production, and at the same time effect a great saving in the use of artificial manures.

The following Table shows the equivalent quantities of artificial manures required to supply the same amount of nitrogen, phosphate and potash as is contained in one ton pure cow urine. For the purpose of comparison the amounts are also stated for one ton well rotted farmyard manure of good quality :—

TABLE.

Quantity and kind of Manure.	Nitrate of Soda required to supply an equivalent amount of nitrogen.	Superphosphate (35 per cent. soluble phosphate) required to supply an equivalent amount of phosphate.	Kainit required to supply an equivalent amount of potash.
One ton pure cow urine	1 cwt.	$\frac{3}{4}$ cwt.	1 cwt.
One ton farmyard manure	$\frac{2}{3}$ cwt.	$\frac{1}{3}$ cwt.	1 cwt.

Although the manurial ingredients in liquid manure are as readily available as those in the artificial manures mentioned in the Table, too close a comparison cannot be drawn from the figures given, because urine suffers loss in storage and application, moreover, it is seldom applied pure.

The drainage from the manure heap is not only rich in the valuable manurial ingredients, viz., nitrogen, phosphate and potash, but it contains the soluble and, therefore, the most valuable part of these constituents. It is not necessary to dilate on the value of liquid manure as a fertiliser. It proclaims its own good properties in no uncertain manner where it is allowed to flow over a pasture or meadow.

### RESULTS OF EXPERIMENTS.

With a view to obtaining definite information as to the value of liquid manure compared with (a) farmyard manure, and (b) a complete dressing of artificial manures applied to the hay crop,

a large number of experiments have been carried out on the Department's farms and by Agricultural Instructors and Agricultural Overseers in many parts of Ireland.

The results of the experiments made by Instructors and Overseers during the four seasons 1911-14 are summarised in the following Table :—

Plot.	Manures applied per Statute acre.	Average of 249 centres, 4 years 1911-14.					
		Yield of hay per statute acre.			Increase due to Manures.		
1	No manure . . . .	T. 2	C. 1	Q. 0	T. —	C. —	Q. —
2	16 tons farmyard manure . .	2	16	3	0	15	3
3	16 tons liquid manure . .	2	17	3	0	16	3
4 {	1 cwt nitrate of soda	2	16	3	0	15	3
	2 cwt. superphosphate . .						
	2 cwt. kainit . . . .						

It will be seen that the three manurial dressings produced very similar results, but that slightly the heaviest average yield has been obtained from the plot to which liquid manure was applied.

The results have been very uniform in the different years, and it is interesting to note that liquid manure has proved equally satisfactory in wet and dry seasons. The tests were made with first crop, second crop and meadow hay.

Everywhere the value of well-made farmyard manure is realised, and the advantages to be derived from the application of a suitable mixture of artificial manures to the hay crop are now almost equally well known, but farmers generally do not recognise that liquid manure is as valuable a fertiliser as has been proved by this experiment.

#### METHODS OF COLLECTION.

Different systems are in use throughout the country for dealing with liquid manure :—

1. Irrigation.—Where conditions are favourable, this is without doubt the most economical system of utilising liquid manure. Unfortunately it is only in exceptional cases that the land near a farmyard lends itself to irrigation. It is also necessary to have a sufficient quantity of water to dilute the liquid so as to ensure its distribution over a wide area. In most cases, owing to the liquid not being thoroughly distributed, all that can be seen is a small patch covered with rank herbage, and the benefits that might otherwise be obtained are practically lost.

2. Use of Peat Moss.—In some districts peat moss or bog mould taken from the bog is used in the byres or stalls, also round about the manure heap for the purpose of soaking up the liquid. This is an excellent system where fairly dry moss can be obtained at a convenient distance from the yard. Unfortunately it is often saturated with water before use, so that its absorptive power is very much diminished. The expense of carting the moss to the yard and again to the field is considerable, but most of this work is generally done when the horses would otherwise be idle. On light land the organic matter in the mould is useful for helping to conserve moisture in dry weather.

3. Sea Sand.—Along the coast sea sand is used for the same purpose and in the same manner as peat moss. The sand contains from 5 to 30 per cent. of lime, which is of considerable value. Its absorptive power is less than peat, and, moreover, it is very heavy to handle. On stiff land the sand has a special mechanical value in helping to keep the soil open. As in the case of peat moss, the expense of cartage would be prohibitive were it not often done when other work for the horses is not very pressing.

4. Direct Application.—The liquid is collected in a suitable tank and conveyed direct to the field. On very small holdings a paraffin barrel is sufficient for the purpose. Whatever receptacle is used it must be placed in such a position that rain water is excluded. Perhaps the best situation on a small holding is to place the barrel outside the byre or stall door, while on a large farm the tank should be placed in a corner of the manure heap, where the soakage from the manure and all the liquid from the byres and piggeries can be drained into it.

The method of direct application is that recommended by the Department, and on most farms a concrete tank would provide the most convenient means of collecting the liquid.

#### CONSTRUCTION OF A TANK.

In deciding as to the size of the tank required it is usual to allow a capacity of not less than 50 gallons per head of stock. A tank constructed on this basis will hold the supply collected during several weeks, together with the water which is used for washing out the byres and piggeries.

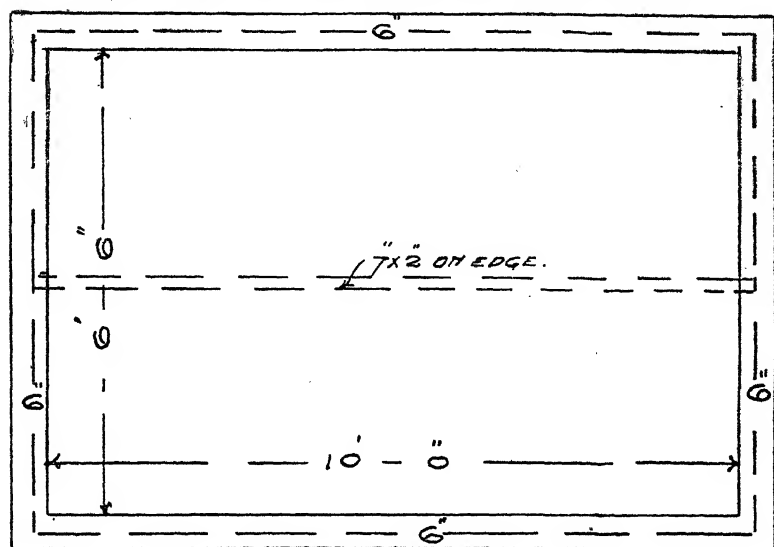
If, for example, the farm stock comprised 40 head of cattle and horses a tank capable of holding 2,000 gallons would be required. As a cubic foot of liquid represents about  $6\frac{1}{4}$  gallons the size of the tank necessary can be readily arrived at by dividing the capacity in gallons by  $6\frac{1}{4}$ . Thus  $40 \times 50 = 320$  cubic feet. To construct

$$6\frac{1}{4}$$

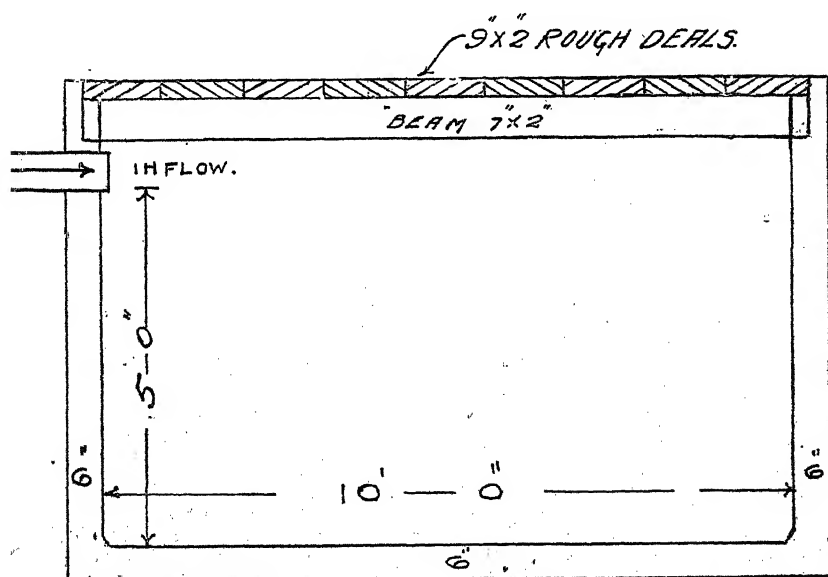
such a tank the length multiplied by the breadth multiplied by the depth must equal 320 cubic feet. This capacity would be

obtained by a tank measuring 10 feet long by  $6\frac{1}{2}$  feet wide by 5 feet deep = 325 cubic feet. A plan and section of a tank of this capacity constructed of concrete composed of 5 parts clean sharp gravel to 1 part best Portland cement and covered with planks are shown below.

LIQUID MANURE TANK—CAPACITY 2,000 GALLONS.



— PLAN. —



— SECTION. —

In some cases, however, it might be more economical to build the walls of 9-inch brick-work and render inside with cement mortar composed of 2 parts clean sand to 1 part best Portland cement.

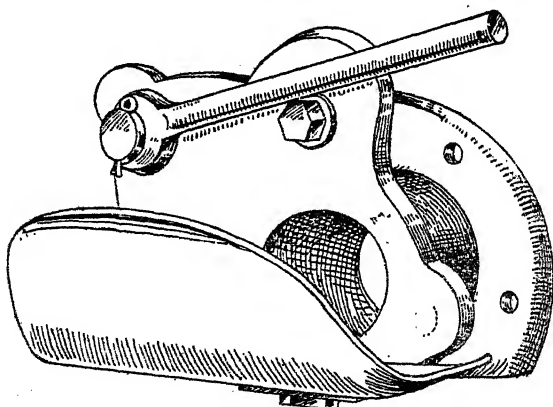
It is important that the depth of the tank should be measured from the underside of the inflow pipe and not from the ground level.

#### MODE OF DISTRIBUTION.

On large farms a cart of some description will be necessary for conveying the liquid to the fields. Specially made liquid manure carts for this purpose can be purchased, but it is not necessary to incur this expense. A barrel of 100 gallons capacity fixed on the wheels, axle and shafts of a cart will suit the purpose admirably. Distribution can be effected by means of a V-shaped trough attached to the end of the cart. The trough should be perforated at regular intervals to ensure that the liquid is spread evenly as the cart is moved forward. A pump on the endless chain principle is the best system of emptying the liquid from the tank into the cart.

On small farms where the cost of the tank, pump and cart would be regarded as prohibitive, a barrel with a spigot (or plug) at the bottom standing in an ordinary cart with the trough attachment could be used for distributing the liquid.

Two types of distributing attachments are shown below.



This type of distributor is that mainly used on the Continent. The attachment is fixed on to the back of a long barrel of wood or iron. The liquid flows against the curved plate, and is more evenly distributed than by any other arrangement. The difficulty, however, is to maintain a uniform pressure in the outflow when

## LIQUID MANURE.

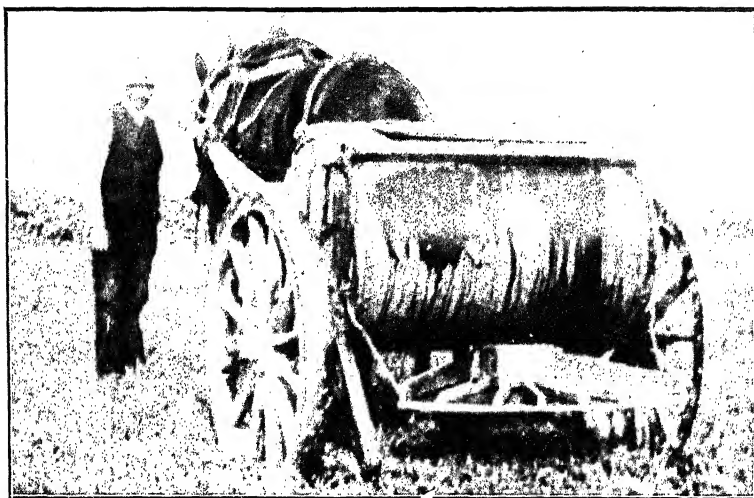


Fig. 1.—A Liquid Manure Cart.

## LIQUID MANURE.

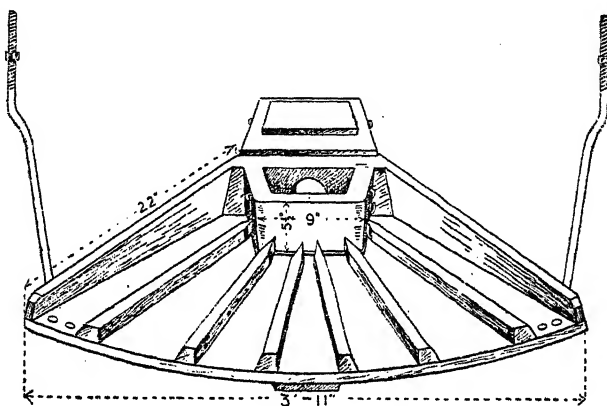


Fig. 2.—Another type of Liquid Manure Cart.



the barrel is nearly empty. This is overcome in some arrangements by the provision of a strong spring under the front of the barrel which is gradually tilted up as the liquid flows out, thus maintaining a fairly even pressure to the end. The great advantage of this form of distributor is that solid matter does not in the least interfere with uniformity of distribution.

In this illustration the attachment is shown with the pipe open and ready for use; when the handle is moved round the pipe is closed and the supply from the barrel is shut off.



This type of distributor is seen attached to a cart in Fig. 1. The liquid flows from the machine into a box and escapes along the bottom on to a spreading board on which pieces of wood are nailed to ensure even distribution. The attachment as illustrated was supplied by Messrs. T. Baker & Sons, Compton, Berks.

Two carts with different methods of spreading liquid manure, which are in use at the Albert Agricultural College, Glasnevin, Dublin, are shown as Figs. 1 and 2.

#### CROPS TO WHICH TO APPLY.

Liquid manure is constantly accumulating, and as the facilities for storage are usually limited it cannot, like farmyard manure, be held over for an indefinite period. It is, therefore, necessary to empty the tank periodically, especially during winter and spring.

At these seasons the choice of crops to which liquid manure can be applied is limited, but there is no crop that responds more freely than first crop hay, and this is available from the time the corn is harvested until May. Moreover, liquid manure can be applied with great success in early spring to autumn sown catch crops,



and particularly to Italian rye-grass. The effect of one or more liberal dressings during February and March is to force on the crop and to ensure a heavy cutting in April or early in May when green food is most valuable.

Liquid manure is well suited for cabbages, mangels, pasture, catch crops, Italian rye-grass and meadows. In spring applications can be given with great advantage to cabbages, and later in the season to mangels, while for meadows dressings may be given up to the middle of May. Good results are obtained from liquid manure applied in winter and spring to pastures. It produces a dense growth of succulent herbage which is readily eaten by all kinds of stock.

The experiments already referred to indicate that for the hay crop at least as good results may be expected from the application of liquid manure as from the same weight of dung. Other tests have shown that excellent results are obtained by applying liquid manure to the other crops mentioned.

In view of these facts it is hoped that the value of this fertiliser will become more widely appreciated, and that farmers will not hesitate to incur the small expenditure involved in the collection and application of the liquid manure which, under existing conditions, is so often entirely lost.

*Copies of this article in leaflet form (No. 12) may be obtained free of charge and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped.*

## PEAT AS A SOURCE OF POWER.

*By* GEORGE FLETCHER, F.G.S., M.R.I.A., *Assistant Secretary in respect of Technical Instruction.*

The problem of the utilisation of peat for industrial purposes is one of perpetually recurring interest, and scientific men in many countries have turned their attention to search out a solution. This is not surprising in view of the fact that the amount of combustible matter in the world's peat deposits exceeds that of all the known coal-fields. For Ireland the question is one of vital interest. Her coal deposits are small and relatively unimportant, while nearly one-seventh of the area of the country, i.e., over two and three-quarter million acres, is covered with peat, much of which is of excellent quality. This represents a vast amount of potential energy awaiting only a practical means of utilising it. Numerous attempts have been made to devise a profitable means of utilising it. Many of the schemes have been ill-considered, or worse, and capitalists are scarcely to be blamed if they are "shy" in regard to any new proposals. Yet a rich reward awaits the successful adventurer. It must not be forgotten that peat constitutes the only fuel for domestic purposes over the larger part of rural Ireland, but this does not affect the utilisation of many large areas of bog as yet wholly undeveloped. Except for such utilisation the peat bogs can only be regarded as a natural disadvantage, as they occupy so large an area of what might otherwise be cultivable land. Attempts have been made and are still being made, to cultivate the surface of bogs, but over a large area of bog this must be regarded as impracticable. The manner in which peat bogs have been formed over undrained marshy areas results in the fact that cultivation would, in general, involve extensive drainage operations.

### PEAT AS A FUEL—ITS DEFECTS.

The defects of peat as a fuel are (1) that it contains and retains a large amount of water; (2) it has, compared with other fuels, a low calorific value; and (3) it is extremely bulky, involving a high cost of carriage. Thus it is that most of the schemes for peat utilisation have been concerned with artificially drying and compressing the material. This can be done readily enough, but the energy consumed in the operation, combined with the low calorific value of peat, renders the commercial success of any such scheme extremely problematical. Other schemes have sought to combine the preparation of a fuel from peat with the extraction of by-products. When one recalls the fact that the by-products of the manufacture of coal gas, once regarded as useless, have come to rival the gas itself in value, this aspect of the peat problem appears full of possibilities; further reference will be made to this.

### PEAT AS A FUEL—ITS POSSIBILITIES.

A new vista of potentialities for peat has opened up in recent years. Just as the nineteenth century will always be associated with the development of the steam engine, culminating in the steam turbine, so will the twentieth century be able to claim the triumph of the internal combustion engine. The success of the gas engine has led to investigations which resulted in the many forms of Producer Gas plant, and there are now many thousands of installations of this method of producing power for mechanical purposes.

A very brief explanation of that form of gas producer known as the suction gas plant may be useful at this point. The object of such plant is to prepare from, or by means of, a suitable fuel a gas which, by exploding it with air in the engine cylinder, yields the motive power desired. The fuel commonly employed is anthracite. This forms a charge in a cylindrical furnace or "producer." Air and steam are admitted to the bottom of the burning anthracite. The oxygen of the air first of all combines with the carbon, of which the anthracite contains about 95 *per cent.*, to form the gas carbon dioxide ( $\text{CO}_2$ ). This, in passing up through the red-hot fuel, is converted into carbon monoxide ( $\text{CO}$ ). The nitrogen of the air remains unchanged. But the steam also reacts with the carbon, the latter combining with the oxygen of the water, thus forming carbon monoxide and hydrogen, both of which gases are combustible. This so-called "water gas" has a high calorific value, and, mixed with the carbon monoxide from the direct union of atmospheric oxygen and carbon, forms the combustible portion of the gas entering the engine cylinder. In such a plant the working of the piston sucks the gas through the producer. An ideal composition for the mixture of air and water-gas thus produced would be  $\text{CO} = 39.0$  *per cent.*,  $\text{H} = 17.0$  *per cent.*, and  $\text{N} = 43.1$  *per cent.*, and the theoretical calorific value of this mixture would be 195.6 British Thermal Units per cubic foot. The actual composition of suction gas is, however, more nearly like the following:—

Carbon monoxide	18.6 <i>per cent.</i>
Hydrogen	17.6    "
Methane	1.6    "
Carbon dioxide	7.2    "
Nitrogen	54.4   "
Oxygen	.6    "

---

100.0

the calorific value of which would be about 140 B.T.U. per cubic foot.

The gas, before entering the engine, is passed through a "scrubber," in which the gas is cooled and cleansed of dust and tarry matter by means of a water spray passing over coke.

Anthracite is most commonly employed as a fuel, but coke is sometimes used where the former is not available. It will be clear that the kind of fuel selected will depend upon the type of producer, the sources of supply, and upon considerations of price. The possibility of utilising peat in producer gas plants was suggested by the Department as far back as 1904.

It is a noteworthy and encouraging fact that an installation at Portadown, shortly to be described, has been found to be entirely satisfactory, and to effect a considerable saving over anthracite. This is the more remarkable, as the by-products are not at present utilised. But these by-products are of considerable value, and it will be of interest to refer to two examples where peat has been used in plant designed to recover the by-products.

The first of these is the power plant of the Società per L'Utilizzazione dei Combustibili Italiani, at Orentano in Italy. This plant, erected by the German Mond Gas Company, is situated on the edge of a bog a few miles distant from Orentano. The area of the bog is about 1,482 acres, of which the Company operating the recovery power plant owns about 500 acres. This portion of the bog has an average depth of about 5 feet of good peat fuel. The bog has to be drained by pumping. The peat, excavated by manual labour, is fed into Dolberg peat machines, and these are provided with belt conveyers to transport the peat to the macerators. Part of it is air-dried, and part mechanically treated and artificially dried. The peat delivered to the producers with an average moisture content of  $33\frac{1}{2}$  per cent., has an average nitrogen content of 1.04 per cent. The nitrogen is recovered as ammonium sulphate, and the gas is used to drive two gas engines of 350 metric horsepower each, which drive alternate current generators—there being a transmission line to Pontedera, ten miles distant.

The second installation referred to is the ammonia recovery power plant of the German Mond Gas Company, situated on the Schweger Moor, about 25 miles from the city of Osnabrück. It is constructed according to the system of Frank and Caro, and was designed to utilise peat containing upwards of 60 per cent. moisture—an important point as lengthening the season during which peat manufacturing operations could be carried on. The gas plant is capable of gasifying and recovering the by-products from 210 tons per day of 24 hours of air-dried peat. The total power capacity is over 3,000 H.P., and the gas engines are coupled to alternators running in parallel. The current, transmitted at a tension of 30,000 volts, is distributed over an area of about 25 miles radius.

If more rapid progress has not been made in solving the problem in the United Kingdom, it must be remembered that in the manufacturing parts of England coal is comparatively cheap, and owing

to its greater heating power is more suitable for producer gas than is peat. In many parts of Ireland, however, coal is very dear, but (and to some extent because of this fact) in these districts we have not at present in existence industries demanding power. The possibility of securing cheap power would be a stimulus to industrial development.

Experiments made some years ago by Dr. Frank and Dr. Caro on Italian peat used in the Mond plant, shewed that one ton of dry peat yielded 62,850 cubic feet of gas of about 150 B.T.U.s. calorific value and 118 lbs. of ammonium sulphate. Mr. Robson, in his "Power Gas Producers," states that "the calorific value of ordinary dry peat is about 7000 B.T.U.s. per pound, or about one-half that of bituminous coal. The latter yields 180,000 cubic feet per ton, of gas from 130 to 150 B.T.U.s. with about 80 lbs. of sulphate; a ton of coal therefore gives fully twice as much gas, but only about 0.675 the amount of sulphate, which it is stated can be obtained from peat. It may be safely assumed that on the average it will cost as much to cut and dry a ton of peat on British bogs as to obtain a ton of bituminous slack delivered there, so that for power purposes coal is the cheaper fuel at the present time." This was written in 1908, and the last statement can hardly be regarded as correct at the present time, or as applied to Ireland. Happily, a noteworthy step has been taken in the way of solving the problem by the action of Messrs. Hamilton Robb, of Portadown. This firm have in Portadown a weaving industry, and a little over four years ago decided to try the experiment of establishing a (peat) producer gas plant. They accordingly installed a suction gas plant constructed by Messrs. Crossley Brothers, Ltd., of Manchester, of a capacity of 400 brake horse-power. The fuel used is peat, and this is cut from a bog some miles distant and dried in the open air by the usual method of stacking. The bog is situated on the shores of Lough Neagh, and the peat when dry is carried as required in barges up the Bann by means of tugs, the distance being some 12 or 13 miles. The peat is at the factory transferred from the barges to the producers by a conveyer (by Messrs. Wadsworth of Bolton) shown in Fig. 2. This peat originally contains from 85 to 90 per cent. of water, but can be dried to 25 or 30 per cent. during a fairly good season. It is of interest to learn, moreover, that Messrs. Crossley have other plants working very satisfactorily from peat in Holland. The Dutch Government installed one at their Labour Colony at Veenhuizen, and careful tests with this plant are said to give a consumption of 3 lbs. of peat per horse power with fuel of 45 per cent. moisture. Although this is the average moisture content of the fuel used in these particular plants, there have been periods during the winter when peat containing 70 per cent. of moisture has been fed to the producer, and the results

PEAT AS A SOURCE OF POWER.



Fig. 1.—Producer Gas Plant, utilising Peat, at Messrs. Hamilton Robb's Factory, at Portadown.

PEAT AS A SOURCE OF POWER.

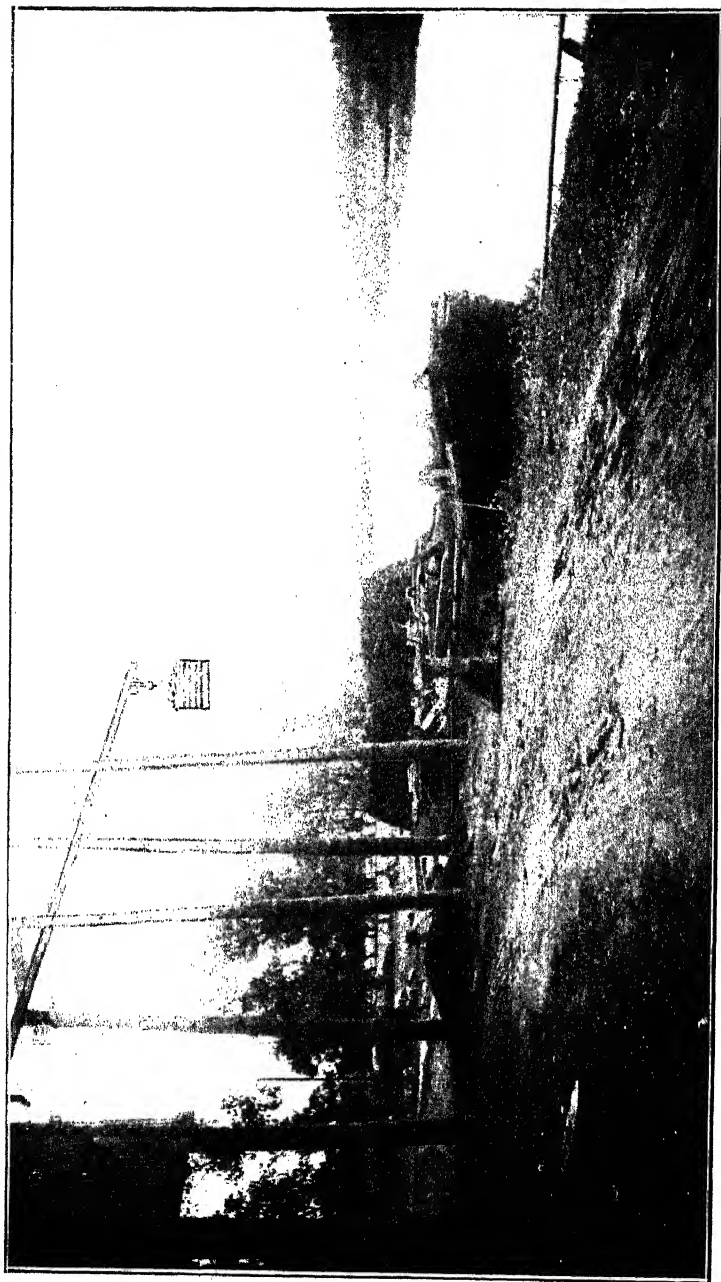


Fig. 2.—Messrs. Hamilton Robb's Installation, with Peat-laden Barges and Conveyor.

have been extremely good. It should be noted that the Power Gas Corporation, Limited, also claim that peat can be utilised in their plant with a moisture content of 70 per cent. From this it follows that there is a great deal of elasticity in the working of this plant. It is understood that in Messrs. Crossley's latest open hearth type of suction plant with stepped grate which permits of the drawing away of the ash and clinker whilst the engine is running under load, they are able to give continuous running from this fuel, and it is possible to run from year to year without drawing the fire. The standby consumption can be reduced to a minimum, as the plant during such periods works as a slow combustion stove. During the standby at nights and week-ends the consumption in a 100 B.H.P. plant can, it is claimed, be reduced to about 10 lbs.

Coming to the installation at the factory at Portadown, it may be noted that the plant supplies gas to two engines, each of 120 B.H.P., and one of 150 B.H.P. There are two producers, each having a capacity of 200 B.H.P. By means of the conveyer the peat blocks are elevated and carried to the feed hoppers on the top of the producers, from which they pass into the generators, where gasification takes place. It is stated that under working conditions, with peat at 5s. a ton, power can be obtained at the rate of one-sixteenth of a penny per horse-power hour.

The following statement as to the comparative cost of running the factory on coal and on peat, was given by Mr. Pegg, A.M.I.C.E., of Belfast, who was engineer for the installation, in a paper before the Institution of Mechanical Engineers, in July, 1912, the figures being supplied by Mr. Mullen, Manager at the Factory.

*Cost of running the Factory on Coal per Week.*

8½ tons of anthracite @ 35s.	£14 17 6
19 tons of steam coal @ 17s.	16 3 0
	<hr/>
	£31 0 6

*Cost of running the Factory on Peat per Week.*

Say up to 50 tons of peat @ 6s.	£15 0 0
Weekly saving	£16 0 6

Allowing for 15s. for extra labour, the net weekly saving figures out at £15 5s. 6d.

It is certainly encouraging to be able to record that the experiment has given complete satisfaction to Mr. Hamilton Robb, that it has resulted in a considerable economy, and that the old plant has been scrapped. So successful has this experiment been, that an extension of it is in contemplation.

It has been pointed out that the gas, before passing to the engine, must be purified, but the substances removed are valuable,



although the by-products of a small plant would not justify treatment. There is nitrogen, which can be recovered as ammonium sulphate, and there is peat ash and peat tar, containing valuable constituents. The question of the utilisation of these by-products are dealt with by Professor Morgan, F.R.S., in the article that follows this.\* It is not unreasonable to assume that with an extension of this method of utilising peat, it would be possible to deal in a profitable manner with the by-products which would thus be produced in a sufficient quantity to allow of their being dealt with in chemical works. We should in this way not only establish an additional industry, but this method of obtaining power from peat would be rendered still more profitable.

It may be added that in the neighbourhood of the bog from which this peat is obtained, near Maghery, is that worked by the Irish Peat Development Company, which manufactures peat litter and also peat dust, in which an export trade is done. The peat is cut by hand, but carried from the banks to the works by means of a light electric railway, which is approximately three miles in length.

The method of winning the peat is a matter of importance, and this is best illustrated by the successful introduction by the Department of the Dutch system of hand-cutting peat for peat moss litter, at the bog of the Irish Peat Development Company to which reference has already been made. The system was also introduced by the Department with equally successful results, at the Turraun Peat Works, at Fermanagh, King's County. The advantages of this system are, that there is smaller breakage and quicker drying. A further advantage is that it is easy to calculate the amount of peat raised by each worker, and so arrive at a basis for his remuneration.

It may be said that the conditions at Portadown are favourable, in view of the neighbourhood of the peat bog to the weaving factory, and it is undoubtedly a very great advantage to be able to avail of water carriage from the bog to the factory. There are, nevertheless, without doubt, many other places in Ireland where corresponding advantages could be availed of. But even in their absence it seems certain that peat could be profitably utilised on the lines indicated, with one modification, though that is an important one. Where a sufficient demand for power exists, it appears certain that instead of carrying the bulky peat either by road or by water, it would be advisable to instal producer plant on the bog itself and to convert the mechanical power into electricity, and transmit the energy at high pressure to the point where it is required. The efficiency of such conversion and transmission is now very high, and the financial results of such a mode of transmission can be ascertained with a considerable degree of accuracy in any case where the conditions can be stated.

\* See pp. 39 *et seq.*

## SOME CHEMICAL ASPECTS OF THE PEAT PROBLEM.

BY GILBERT T. MORGAN, D.Sc., F.R.S., F.I.C., A.R.C.Sc., M.R.I.A.

*Professor of Chemistry in the Faculty of Applied Chemistry, Royal College of Science for Ireland.*

Among the important matters overshadowed by the War is the perennial problem of the economical utilisation of peat. Yet the question is one in which the belligerent countries are directly interested inasmuch as peat is found principally in high latitudes. Extensive deposits exist in Great Britain, France, Russia, Italy, Scandinavia, Germany, and Austria. One-seventh of the total area of Ireland is covered by peat and enormous tracts of this deposit are found in Canada. For more than a century the problem has received the attention of numerous scientific investigators and has been attacked from many different points of view.

Only two years before the outbreak of war a practical solution of the problem was claimed for Germany by Dr. Carl Duisberg, a Director of the Colour Factory of F. Bayer & Co., Elberfeld, who at the Congress of Applied Chemistry held in 1912 at New York, stated his case in the following words:—

“The latest and most rational method of utilising the peat or turf beds which are so plentiful in Germany and many other countries is practised in Schweger Moor near Osnabrück, according to a process discovered by Frank and Caro. There peat gas is produced and utilised and ammonia obtained as a by-product, the required power being generated in a 3,000 H.P. central electric power station. The moorland, after removal of the peat, is rendered serviceable for agricultural purposes.

“At that place nearly 2,500 to 2,600 cubic metres of gas with 1,000–1,300 calories were obtained from 1,000 kilograms of absolutely water free peat in the form of air-dried peat with 45 to 60 or 70 per cent. of moisture. This gas represents energy equal to 1,000 H.P. hours equal to 700 kilowatt hours, after deducting the heat and power used for the operation of the gas works. In addition 35 kilograms of ammonium sulphate were produced from the above quantity of peat which contains one per cent. of nitrogen.”

The foregoing development appears to be a practical realisation of the view held by many workers on peat in this country that the most economical use to make of this combustible is to convert it into gaseous fuel in suitable gas-producers. Some of the earlier attempts

at this solution of the peat problem are summarised in Professor Ryan's comprehensive reports on the Irish peat industries. (*Economic Proc. Royal Dublin Soc.*, 1908, I., pp. 522-529.)

Other methods of disposing of peat must, however, be taken into account, such as the production of peat litter and peat molassine. Moreover, the recent epoch-making discoveries of Professor W. B. Bottomley (*Ann. Botany*, 1914, 28, 531) on the application in agriculture and horticulture of bacterised peat or "humogen" will, when put into practice on an extended scale, lead to the utilisation of large quantities of turf. But nevertheless these outlets for peat will still leave available for fuel enormous quantities of turf, which should preferably be converted into gaseous fuel because by this process it becomes possible to recover certain valuable by-products.

When peat is treated in a gas-producer the products are combustible gas, ammonia, ash, tar and an aqueous distillate containing certain technically important organic compounds. The combustible gas, which is comparable in calorific power with that obtained from lignite, consists of carbon monoxide and hydrogen mixed with the non-combustible gases, nitrogen and carbon dioxide. The peat-producer gas is generally free from sulphur, the absence of this element being of great advantage in a gaseous fuel used in iron and steel industries and in the manufacture of glass and ceramic wares.

At present the only plant of this description in Ireland is the gas-producer furnishing the gaseous fuel for the gas engines of the factory of Messrs. Hamilton Robb, Ltd., of Portadown. It is of interest to note that although on account of the comparatively small capacity of the plant no attempt is made to recover and utilise any by-products, yet, nevertheless, this installation has proved to be a financial success. There can be little doubt that in a scientifically controlled plant, large enough to render practicable the recovery of ammonia and other by-products, the economy effected would be considerably greater.

#### BY-PRODUCTS FROM THE PEAT-GAS PRODUCER.

*Ammonia.*—Peat may contain from 0.5 to 2.5 per cent. of nitrogen, and in recent years considerable improvements have been made in the way of increasing the yield of ammonium sulphate recoverable from this combined nitrogen.

By passing steam over peat heated to 350-550° almost the whole of the nitrogen is obtained as ammonia (Caro, *Chem. Zeit.*, 1911, 35, 505). With a peat containing 50-70 per cent. of water and 1.05 per cent. nitrogen, Frank, by operating on 50-60 tons of wet peat at a time obtained 90 pounds of ammonium sulphate per ton of peat. This yield corresponds with 77-80 per cent. of the total nitrogen.

SOME CHEMICAL ASPECTS OF THE PEAT PROBLEM.

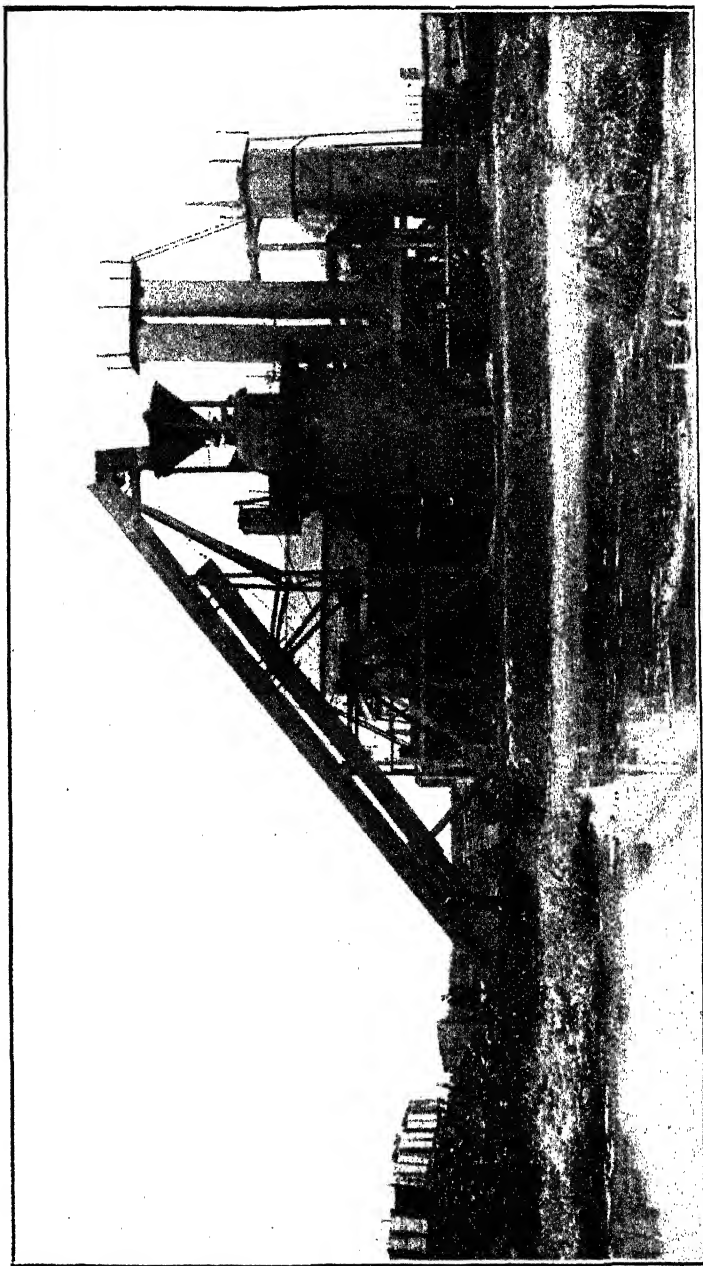


Fig. 1.—The first Producer plant in the world making regularly Producer gas and ammonium sulphate from wet peat, containing up to 75% of water.

## SOME CHEMICAL ASPECTS OF THE PEAT PROBLEM.

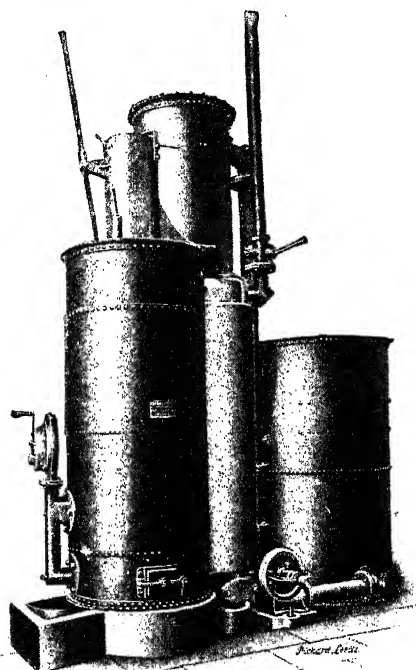


Fig. 2.—Suction pressure semi-bituminous gas Producer. Installed in single units, 20 B.H.P. up to about 400 B.H.P., handling peat containing not more than 37% of moisture, and in torves of any size not exceeding 8"  $\times$  4"  $\times$  4"; the turf to be reasonably free from dust.

Caro has raised the yield to 85 per cent. of the total nitrogen working on peat containing 60 per cent. of water.

Similar improvements have been embodied in the modern types of Mond plant so that now it is possible to recover the greater part of the nitrogen of peat in the form of the valuable fertiliser, ammonium sulphate. The other commercial nitrogenous fertiliser is sodium nitrate, a substance also required in the manufacture of nitric acid as a starting point in the production of explosives and synthetic dyes. The importance of increasing the output of ammonium sulphate from peat lies in the circumstance that this salt can displace sodium nitrate as a nitrogenous manure thus rendering the nitrate available for the manufacture of explosives and other chemical products.

For the four illustrations of producer plant specially designed for the gasification of peat with ammonia recovery I am indebted to the Power-Gas Corporation, Limited, of Stockton-on-Tees. This Corporation who, in 1905, first turned their attention to this method of utilising peat have obtained the extremely favourable results tabulated below :—

FUEL USED	GERMAN PEAT per cent.	ITALIAN PEAT per cent.	ENGLISH PEAT per cent.
Moisture content of fuel .	40 to 60	15	57.5
Nitrogen content of fuel .	1.0	1.58	2.3
Quantity of gas produced per ton of theoretically dry peat .	cu. ft. 85,000	cu. ft. 60,000	cu. ft. 90,000
	B.T.U. per c.f. 150	B.T.U. per c.f. 166	B.T.U. per c.f. 134
Heat value of gas produced .			
Sulphate of ammonia produced per ton of theoretically dry peat . . . . .	70 lbs.	115 lbs.	215 lbs.

The Simon-Carves Bye-product Coke-Oven Construction and Working Company, Limited, have made large scale experiments on the gasification of peat in Moore gas producers. Very favourable results were obtained, and for the data of a 7 days' test on Norfolk peat I am grateful to Mr. J. H. Brown of this Company. Peat, containing 63 per cent. of moisture and with a nitrogen content of 2.235 per cent., yielded per ton 94,850 cubic feet of gas (100 B.T.U. per cubic foot) and 168 pounds of ammonium sulphate. A longer run would certainly have given even more of this salt.

These experiments confirm the claims made by Dr. Duisberg, and demonstrate conclusively that peat containing a high proportion of moisture can be gasified so as to yield a gas fuel of high calorific value with a good recovery of nitrogen in the form of ammonium sulphate.

*Peat Ash.*—Peat differs from wood in yielding on combustion a comparatively large and variable proportion of mineral ash the amount varying from 5 to 15 per cent.

There are very few published analyses of the ash of peat. A determination of the constituents of the ash of a moss peat from a

high moor in the Canton of Zürich, Switzerland, made in 1859 by H. Bohl (*Dinglers Journal*, 153, 223), showed that the ash contained the oxides of aluminium, iron and calcium existing to a considerable extent in the form of carbonate, sulphate, silicate and phosphate. The ash also contained a very appreciable amount of alkalis, with a preponderance of potash.

As the peat ash must consist in part of those mineral constituents of the soil originally assimilated during the growth of the peat vegetation it may fairly be assumed that the ash constituents would act beneficially when restored to the land rendered available for cultivation by the removal of the peat. This applies especially to the potash and phosphate present in the peat ash. By using the peat ash as a dressing for the recovered land the potash locked up in peat would be rendered available for agriculture at a time when the shortage of this alkali is felt very acutely.

*Peat-producer Tar.*—The incomplete combustion of peat in the producer leads to the formation of a certain proportion of tar which is collected in the hydraulic scrubbers of the plant. As the result of many trials made at the Fuel Testing Station at Ottawa it was concluded that the tarry components of the gas evolved in the upper zones of suitable producers could not be entirely burnt or split up into permanent combustible gases. The condensation of a certain amount of tar is unavoidable, and special means of removing this by-product must be adopted.

The amount of tar produced yearly in the Portadown plant is about one hundred tons. Samples of this waste product were examined in the chemical laboratories of the Royal College of Science for Ireland when the results showed that a fractional distillation of the tar resulted in the isolation of substances of industrial importance.

A greatly increased output of the peat tar is, however, the first essential step towards commercial success in this direction. This increase would result naturally from the installation of large plants for the gasification of peat or from an increase in the number of factories using gas fuel derived from peat. Ten installations comparable in size with that of Messrs. Hamilton Robb, Ltd., would yield approximately an annual output of 1,000 tons of peat-producer tar, a quantity which would furnish a practical basis for the industrial exploitation of the derivatives of this tar.

Many experiments have been made on the distillation of peat and on the fractionation of the resulting peat tars, but the results, which are summarised in Professor Ryan's instructive report, indicate that our knowledge of the chemical nature of the products is far from complete (*loc. cit.* p. 516, compare Dvorkovitz, *Journ. Soc. Chem. Ind.*, 1894, 17, 596). The older distillations were not made under conditions comparable with those obtaining in gas-producers, but in spite

SOME CHEMICAL ASPECTS OF THE PEAT PROBLEM.

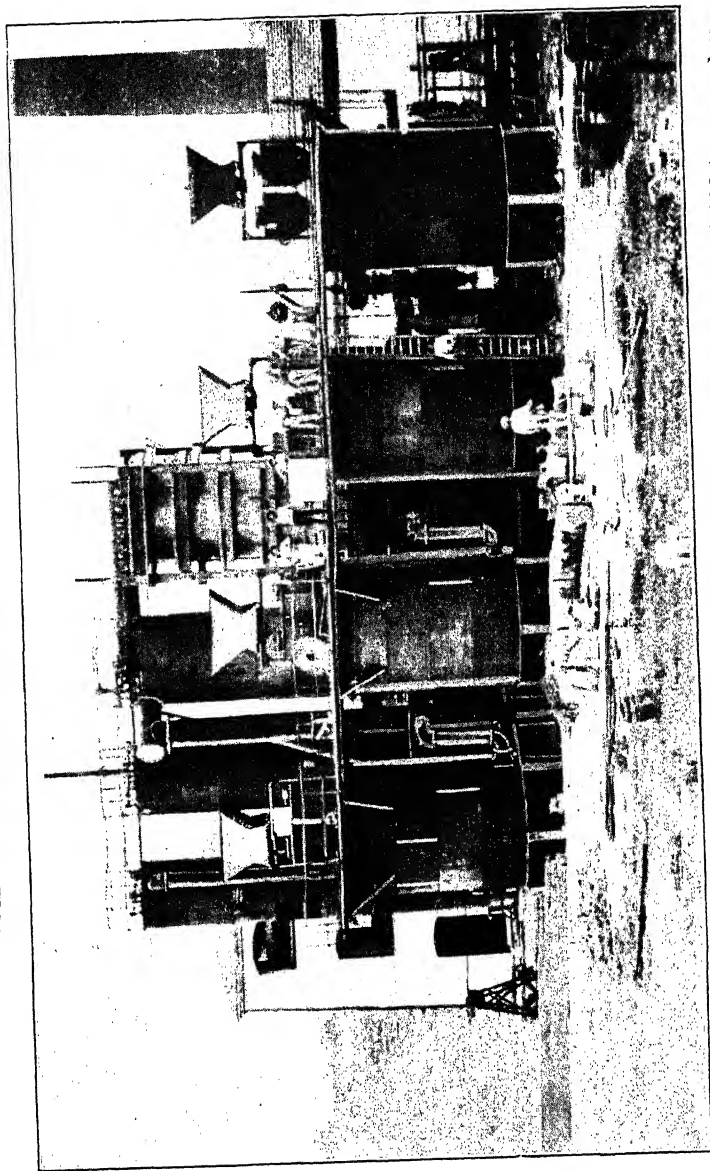


Fig. 3.—Peat power gas plant, with Ammonia Recovery, designed to gasify about 100 tons per day.  
In operation at a Central Electric Station, Pontedera, Italy.



SOME CHEMICAL ASPECTS OF THE PEAT PROBLEM.

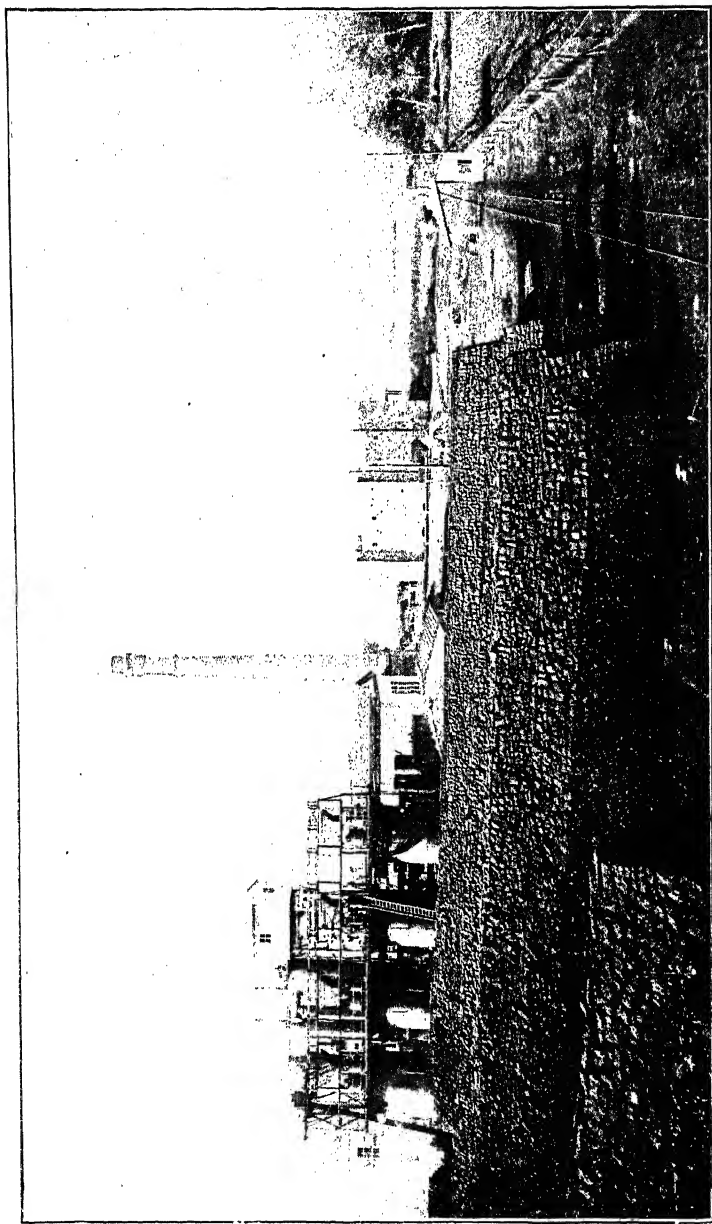


Fig. 4.—The Pontedera installation with peat stacking area in the foreground.

of this difference the products of the fractional distillation of the respective tars appear to be somewhat similar.

In the experiments carried out by myself and Mr. G. E. Scharff (*Economic Proc. Royal Dublin Soc.*, 1915, II. 161-167) distillation of the moist crude producer tar effected a separation of certain volatile oils from a non-volatile bituminous material (crude pitch) amounting to about 17 per cent. of the total tar. By heating the crude pitch to 122° C. and pouring off the liquid portion about 6 per cent. of a refined soft pitch could be separated from a solid friable carbonaceous residue.

This pitch, either alone or mixed with the carbonaceous matter, could be used as asphalt, as a caulking material or as an insulator in electrical work. The carbonaceous matter could be utilised separately as a self-briquetting combustible of high calorific value.

The moist peat-producer tar contained about 29 per cent. of water and yielded on distillation 50 per cent. of volatile

**Volatile Oils** oils. The latter by further treatment were separated from Peat Tar. into neutral oils, waxes, and acidic oils.

**Acidic Oils.**—The last of these fractions was obtained by extracting the crude distillable oils with dilute caustic soda and reprecipitating the acidic oils from the alkaline extract by means of a mineral acid. Fractional distillation of the acidic oils showed that these substances consisted principally of complex phenolic compounds. Attention was specially directed to these substances as they seemed likely to afford material for the manufacture of useful disinfectants comparable in efficacy with lysol, creolin, cyllin, and other coal tar disinfectants.

It was formerly known that peat tar contained substances having antiseptic properties, but these compounds had hitherto neither been isolated nor standardised

**Peat Disinfectants.** (compare Ryan *loc. cit.* p. 514; Szek, *Eng. Pat.* 15606/1902).

The well known Rideal-Walker test for disinfectants and the modified procedure devised by Martin and Chick afford methods for controlling quantitatively the separation of the germicidally active acidic oils from peat tar, and for ascertaining the bactericidal value of these acidic oils. Phenol and the cresols are segregated in the fraction boiling below 200° C. which is about seven times as toxic as phenol itself towards *Bacillus typhosus*. The fraction of acidic peat oil boiling at 200-250° is 17 times as active as phenol (carbolic acid) on the same pathogenic organism.

The most intense germicidal activity is possessed by the fraction of acidic peat oil boiling at 253-360°, for this product has a phenol (carbolic acid) coefficient of 31. (Morgan and Scharff, *Eng. Pat.* 19,253/1914.)

These results show that by distillation and simple chemical treatment of the oils obtainable from peat-producer tar one can, under appropriate bacteriological control, isolate oils of intense bactericidal activity suitable for the manufacture of antiseptics, disinfectants and germicides. When it is remembered that phenol (carbolic acid), the standard disinfectant of this type, is greatly required in the manufacture of explosives (lyddite), drugs (salicylic acid, aspirin, etc.), as well as for many other synthetic products, it will be readily realised that these peat disinfectants would be welcomed as efficacious substitutes for carbolic acid, if they were forthcoming in sufficient amount, especially at the present time when antiseptics are so urgently needed.

These fractionated germicidal oils can be employed either severally or in varying combinations in the manufacture of antiseptics, disinfectants, and germicides. For this purpose they may be used either in a concentrated form or diluted with organic solvents. These oils are sparingly soluble in water and can be used in suspension in this medium. They can also be employed in an emulsified condition, the emulsification being produced by their intimate mixture with gum acacia mucilage, castor oil soap, or other well-known emulsificants.

These germicidal oils can also be made up into solid disinfectants by mixing with hard soap, cane sugar, milk sugar, dextrine, starch, gums, resins, or with porous materials such as fuller's earth, infusorial earth, gypsum, powdered chalk, or whiting, slaked lime, animal charcoal, wood charcoal, or other absorbents.

The neutral oils left after extracting the germicidal acidic oils with alkali were purified by fractionation when the lower fractions were obtained as clear pale yellow liquids darkening rapidly on exposure to the atmosphere until they become dark brown and almost opaque. During this process the oils absorb a considerable proportion of atmospheric oxygen.

The foregoing neutral oils could be used as lubricants, as liquid fuel, for example, in Diesel engines, and when mixed with the pitch from peat tar would furnish a refined tar.

The chemical reactivity of these neutral (non-acidic) oils shows that they do not consist wholly of members of the paraffin series. Their exact relationship to other hydrocarbon series is not known with certainty and they would certainly repay further investigation.

The higher fractions of the neutral oils boiling above 250° C. deposit on cooling considerable quantities of crystalline solid. This material, when drained and dried, is an almost colourless wax melting at 35–40° C., and would serve as a promising starting point for the manufacture of candles.

The aqueous distillate from the producer contains in addition to ammonia certain organic substances soluble in water, among which have been recognised methyl alcohol, acetone, acetic acid and its immediate homologues, and pyridine bases. All these compounds are of industrial importance. Methyl alcohol is an important solvent and the starting point for formaldehyde. Acetic acid and its homologues are required for the manufacture of acetone and other ketones. Acetone is an important solvent used in considerable quantities in the manufacture of the explosive, cordite. The pyridine bases are pungent liquids useful both as solvents and as disinfectants. The recovery of these compounds could be rendered practicable by suitably modifying the condensers and scrubbers of the peat-producer plant.

### SUMMARY.

1. Peat has long been employed as a domestic fuel. Its industrialisation could be most efficiently brought about by gasifying it in gas producers, as this procedure would render feasible the recovery of several valuable by-products.

2. The combined nitrogen of the peat can be economically recovered in the form of ammonium sulphate. This valuable fertiliser, together with the peat ash containing potash and phosphoric acid, could be restored to the land from which the peat has been taken.

3. Peat tar, another by-product, can be fractionated into the following useful materials:—refined pitch and tar, candle wax, lubricating and burning oils, and very powerful disinfectants, greatly exceeding carbolic acid in germicidal strength.

4. The aqueous distillate from the producer contains methyl alcohol, acetone, pyridine bases and crude acetic acid, all of which are capable of recovery and utilisation.

The economical utilisation of peat in the generation of gaseous fuel, even without recovery of by-products is to-day an accomplished fact. It can scarcely be doubted that, with efficient chemical control, a larger plant of sufficient capacity to deal rationally with the ammonia, tar, and other products of the destructive distillation of peat would lead to still greater economies in the employment of this important combustible.

I desire to express my thanks to Mr. W. Lawson of the Power Gas Corporation, Limited, of Stockton-on-Tees, for the loan of the blocks employed in the illustrations of this article, and for valuable data relating to the ammonia recovery process as effected in the Mond producer plant.

## DEPARTMENTAL COMMITTEE ON FOOD PRODUCTION IN IRELAND.

The Committee on Food Production in Ireland, which the Chief Secretary for Ireland directed to be appointed, has completed its sittings, and has submitted to the Government its considered Report.\*

The Committee consisted of the following members :—

The Right Hon. T. W. Russell, M.P., Vice-President of the Department of Agriculture and Technical Instruction for Ireland (Chairman).

Mr. John Bagwell, General Manager, Great Northern Railway (Ireland).

Mr. Hugh T. Barrie, D.L., M.P.

Mr. C. F. Bastable, M.A., LL.D., Professor of Political Economy, Dublin University.

Mr. John Boland, M.P.

Mr. Robert N. Boyd, Carnall, Carnmoney, Co. Antrim.

Mr. J. R. Campbell, B.Sc., Assistant Secretary in respect of Agriculture, Department of Agriculture and Technical Instruction for Ireland.

Mr. Robert Downes, J.P.

Mr. William Field, M.P.

Mr. Thomas P. Gill, Secretary, Department of Agriculture and Technical Instruction for Ireland.

Mr. James S. Gordon, B.Sc., Deputy Assistant Secretary in respect of Agriculture and Chief Inspector, Department of Agriculture and Technical Instruction for Ireland.

The Most Rev. Dr. Kelly, Lord Bishop of Ross.

Mr. William McDonald, J.P., ex-Chairman, Cork County Council.

Mr. Hugh de F. Montgomery, D.L., Fivemiletown, Co. Tyrone.

Mr. George Murnaghan, J.P., Omagh, Co. Tyrone.

Mr. Joseph O'Connor, Mylerstown, Naas.

Mr. Patrick J. O'Neill, J.P., Chairman, Dublin County Council.

The Right Hon. Sir Horace C. Plunkett, D.C.L., K.C.V.O., etc., President, Irish Agricultural Organisation Society.

Mr. E. A. M. Morris, M.A., Barrister-at-Law, Department of Agriculture and Technical Instruction for Ireland, acted as Secretary to the Committee.

The Committee held sittings on 18th, 14th, 15th, 21st, 22nd,

\* Report of the Departmental Committee on Food Production in Ireland. Cd. 5046—1915. Price 3d.

23rd July, and 4th, 5th and 6th August, 9 meetings in all, and examined 12 witnesses, viz. :—

- Mr. J. M. Aimers, Secretary, Irish Corn Traders' Association.
- Mr. R. A. Anderson, Secretary, Irish Agricultural Organisation Society.
- Mr. T. J. Crowe, Menlough Co-operative Agricultural Society.
- Mr. J. Hunt, Co. Roscommon.
- Mr. E. W. L. Holt, Chief Inspector of Fisheries, Department of Agriculture and Technical Instruction for Ireland.
- Mr. P. MacNulty, Transit Inspector, Department of Agriculture and Technical Instruction for Ireland.
- Mr. J. Milne, J.P., Chairman, Irish Manure Manufacturers' Association.
- Mr. D. S. Prentice, Chief Inspector, Veterinary Branch, Department of Agriculture and Technical Instruction for Ireland.
- Mr. James Robertson, Representing the Irish Seed Trade Association.
- Mr. S. Smith, Representative in respect of Marketing, Department of Agriculture and Technical Instruction for Ireland.
- Mr. W. T. Watson (Messrs. Paul and Vincent).
- Mr. T. Wibberley, Irish Agricultural Organisation Society.

The Reference under which the Committee sat was in the following terms :—

“To consider and report what steps should be taken by legislation or otherwise for the sole purpose of maintaining, and, if possible, increasing the present production of food in Ireland on the assumption that the war may be prolonged beyond the harvest of 1916.”

This Reference was held to involve immediate action, seeing that the produce of the harvest of 1916, which will largely govern the food position until the harvest of 1917, could be increased only by action taken during this autumn.

The main objects to be aimed at, in effecting an increased supply of food in Ireland, were, in the opinion of the Committee, as follows :—

- (a) A material increase of the area under tillage, not only with a view to the direct production of more human food, but also to the indirect production of the same by increasing the amount of fodder available for cattle.
- (b) The maintenance, increase and improvement of breeding stock of all kinds.
- (c) The improvement of the farmers' position in regard to the means of obtaining the use of machinery and implements.
- (d) The conservation of the artificial manure supply of the country.
- (e) The maintenance of the Irish fishing industry.

Having carefully considered a series of tables showing the agricultural position of the country, specially prepared for their information by the Statistics and Intelligence Branch of the Department, the Committee state that in their opinion the Statistics relating to live stock indicate a rather grave condition of affairs.

### *The Maintenance of Live Stock Act, 1915.*

The Committee, therefore, notes with satisfaction the passing of the Maintenance of Live Stock Act, 1915. Under this measure powers are conferred upon the Department of Agriculture and Technical Instruction to stop alike the slaughter of breeding stock in Ireland and the movement of animals where slaughter is prohibited, i.e., the export of such stock to Great Britain, or even their movement in Ireland. The measure also confers powers for dealing with immature stock. In its present form the Act, though wide in its scope, is merely a temporary or emergency measure. Its permanent enactment may be desirable in order to confer power on the Department to take action in future, should an emergency arise, without fresh legislation. The Departmental witnesses before the Committee were satisfied that the Act gives powers quite adequate for safeguarding the breeding stock of the country. These powers vigorously exercised, together with the Improvement of Live Stock Schemes in operation in each county, ought to be sufficient not only for the maintenance but for the extension of the Irish cattle trade.

### *A Minimum Price for Wheat and Oats for a Period of One Year.*

Having considered the returns submitted dealing with the crops, particularly the cereal crops, the Committee desires to say that while the figures for the year 1915 cannot be considered wholly unsatisfactory, yet they leave abundant room for improvement. The Committee is not prepared, however, to take upon itself to express an opinion as to the extent of the danger threatening our present and future food supplies generally. The Committee feels that this is a matter only within the competence of the Government. It is for the Government also to take the responsibility of deciding whether exceptional steps should be taken in order to increase the growth of certain food crops. But assuming that the Government takes this responsibility, then the Committee agrees that the measure best calculated to effect this object in Ireland, where persuasion on the people in this direction has been exerted to the fullest extent, is the guaranteeing by the Government of a minimum price in the case of Wheat and Oats.

The Committee believes it to be an essential principle in fixing the amount of any minimum price that it should be regarded as an insurance against loss to the farmer, not as a bonus. If the farmer is asked to break up land and to run risks as to the result, the Committee does not feel that in a time of emergency there is any departure from sound economic policy in agreeing to a minimum price to secure the farmer against loss. The Committee is further agreed that the minimum price should apply only to the specific crops named, otherwise the expedient would be dangerous, both in the interests of the agriculturist and of the consumer.

In the opinion of the Committee it is important to encourage the growing of wheat for Irish consumption and thus to prevent the outflow of money from Ireland, and to relieve the population of this country from dependence on foreign agriculture for the prime necessity of life. Care must be taken, however, that the cultivators are not artificially encouraged to grow wheat under conditions of soil and climate more suitable for oats; and therefore, if a minimum price be guaranteed for wheat a relative minimum price must be guaranteed for oats, which should remain the staple crop in Ireland.

In regard to the amount of the minimum price, the Committee recognises that the question of amount has a vital bearing on the general question of the advisability of a minimum price. The figure should be most carefully estimated with a view to its being no more than enough to give the farmer a feeling of security in growing the required crop, having regard to the normal conditions of his business. The price should not be such as to prove an obstacle in his mind, by setting up an artificial standard, to the growing of the crop in subsequent years when a normal profit is available.

As to the length of time during which the guaranteed minimum price should operate, the Committee holds that it should be for one year only. It is held that if a price which is sufficient to guarantee the farmer against loss is arrived at, this would prove an adequate inducement to the great mass of farmers in the country to grow a fair proportion of the crop to which it applies and which they are called on to grow in the interests of the country. A proposal going beyond this limit would be regarded as exceeding the requirements of a war measure, and as contemplating a policy upon the expediency of which opinions are sharply at variance.

#### *Facilities to enable Landholders to obtain Implements and Machinery.*

Throughout the inquiry the Committee was impressed with the fact that Ireland is an agricultural country where 85 per cent. of the occupiers of the land are small holders. In this connection



the Committee was convinced that some system of loans to enable small holders to obtain the use of agricultural machinery and implements, including meal mills for grinding their home-grown wheat and oats, was necessary if much further progress was to be made with the agriculture of the country. Evidence was given by small holders of land in the West of Ireland which showed that some Co-operative Societies had borrowed money from the local banks at 4 per cent. to purchase implements, and had hired them out with satisfactory results. It was also shown that the Department of Agriculture and Technical Instruction had set aside a large sum out of their Endowment as a Loan Fund for this purpose, and that their Assistant Overseers had taught the use of the several implements to the tenants, especially in the western area. Neither of these schemes is open to objection, and they are deserving of development.

The Committee is agreed as to the need of a system by which loans should be made to the smaller holders for this purpose, and they are of opinion that, without unduly trenching upon any of the special methods of trading the County Committees of Agriculture might be asked to take charge of such a scheme in their several districts. These Committees are already practised in working the agricultural schemes of the Department involving the supply of manures and seeds. Such work, therefore, would not be out of the ordinary class of business entrusted to these Committees which it may be remembered are statutory in character.

### *Manures, Feeding Stuff, and Seeds.*

The Committee heard important evidence as to the supply of Manures, Feeding Stuff and Agricultural Seeds. None of the witnesses seemed to fear the danger of any shortage save in the supply of basic slag. The Committee is unanimous in recommending the prohibition of the export from the United Kingdom of artificial manures and of the constituents used in their manufacture. This prohibition is specially necessary in the case of basic slag and sulphate of ammonia.

### *Opinions of County Committees of Agriculture on the subject of the Inquiry.*

In regard to other branches of the agricultural industry, the Committee is aware of the fact that the Department of Agriculture has been for many years engaged in promoting schemes of agricultural education by means of machinery which is national in character and covers every rural parish in the country. To a very great extent this education is conducted by Committees of Agriculture in connection with the various County Councils.

These Committees are in close touch with the people; and before finally arriving at its conclusions the following queries were addressed to these bodies by the Departmental Committee:—

1. How can the diminution of breeding stock in Ireland be counteracted:—

(A) by prohibition of slaughter and export of breeding and immature animals;  
and, if such prohibition is recommended, under what circumstances and to what classes of animals should it be applied;

(B) By inducements to keep breeding and immature animals in the country?

2. How can the cultivation of an increased amount of crops be best encouraged:—

(A) As regards corn crops;

(B) Potatoes;

(C) Fodder crops?

3. What percentage of increase in these several classes of crops would be possible in your county?

The Committee has been impressed with the answers which have been received to these queries, and desires to point out that they all suggest that inducement in some form or other to the farmer called upon to do something which may expose him to greivous loss is essential. The Committee feels that too much consideration cannot be given to such expressions of opinion coming from bodies specially charged with the working of agricultural schemes throughout the country.

#### *Loans for Fishing Boats and Gear.*

Fish is an important article of food in Ireland, especially among the poorer people, and the Committee, therefore, gave the question of the maintenance of the supply their careful consideration. The Committee is of opinion that no steps designed to increase the supply of sea fish by way of provision of piers and harbours can be effective during the period of the war. But the system of loans for the provision of boats and fishing gear has been restricted and interrupted, and this will undoubtedly reduce the normal supply of fish at a time when an increase of food production is highly desirable. Hence the Committee is of opinion that these loans should not only be continued but extended. With regard to inland fisheries, the Committee understands that there has been no shortage in recent

years, and that while something could be done to develop these fisheries, such development would necessarily be a matter which would only materially affect the supply after some considerable time. For these reasons the Committee refrains from making any recommendation as to the inland fishing industry.

### *Appeal to Landholders.*

Before concluding its Report the Committee desires to appeal to the landholders of Ireland, both farmers and labourers, to put forth their best energies to promote the vital interests of themselves and their fellow-countrymen. During the war there is an unprecedented expenditure of the wealth of the United Kingdom, and hence arises a great national need of taking from the soil the most and the best that it can produce. There are in Ireland some millions of acres of second and third rate grass land which at present produce little, but which if tilled would give good crops, and when laid down again would become much more productive of hay and grass.

In present circumstances the value of the imports of the United Kingdom exceeds the value of the exports by one million pounds a day. This creates an adverse balance of trade, with the result that there may be grave pressure on the gold reserves of the United Kingdom which may lead to the most serious effects on the condition of all classes of the people. Accordingly all those who confine themselves to the use of home-grown food do a service to their country. This policy should be followed as far as possible by the population, both urban and rural. The import of foreign feeding-stuffs for animals has the same effect as the import of human food. The Committee strongly urges on the people of Ireland the fact that the greater the amount of food and feeding-stuffs raised in Ireland, and the less of imported commodities used the more they will safeguard their vital interests and lighten the strain and lessen the sufferings of the war.

The Report was signed by all the members of the Committee—though some members made additions and reservations—except two. The two members who did not sign were Mr. H. de F. Montgomery and Sir Horace Plunkett, K.C.V.O., F.R.S. Mr. Montgomery explained his reasons for not signing the Report as follows :—

#### STATEMENT BY MR. H. DE F. MONTGOMERY, D.L.

I have not signed the Report agreed to by the majority of the Committee, because it appears to me that a document dealing with the best mode of increasing food production in a country where 85 per cent. of the agricultural holdings are under 50 acres,

which makes no adequate reference to the agricultural co-operative movement, is misleading.

Subject to the above objection and to the dissent on certain points which I have signed jointly with Mr. Bagwell, and to some of the criticisms in Sir Horace Plunkett's minority report (referred to below) I am in substantial agreement with the contents of the main report.

I have read Sir Horace Plunkett's minority report. I am in general agreement with its drift and in complete agreement with the statements, criticisms, opinions and suggestions as regards the inept statement that "persuasion on the people in this direction (increased growth of certain food crops) has been exerted to the fullest extent."

#### MINORITY REPORT OF SIR HORACE PLUNKETT.

Sir Horace Plunkett put in a Minority Report giving the following explanation of his reasons for doing so :—

I would have gone to great lengths in sinking my personal opinions in order to concur in the main Report of the Food Production Committee, had not a governing principle of agricultural policy been involved. If I had signed that document I should have had to put on record so many reservations and notes of dissent that it would have been extremely difficult for anyone who had not been present at the deliberations of the Committee to see just where I stood. And little as my personal views might matter, I had to remember that as President of the Irish Agricultural Organisation Society (whose letter to the Committee is appended to, and should be read with, this Report) I speak for tens of thousands of farmers, whose opinions and wishes I am in a position to know.

In order to have adequate expression given to these views, I drafted a Clause embodying the principle at issue, and handed it to the Chairman before we met to consider his draft Report. I asked him to permit its insertion at the point where, if it was accepted, it would logically belong. The Chairman ruled that as my Clause contained wholly new matter (i.e., co-operation, which had occupied about five hours in examining witnesses of the I.A.O.S.) it could not be taken until the Committee had disposed of his Report. When this was done, I moved my Clause, and after the most emphatic expression of his own hostility to it, on the ground that it suggested friendly relations which he said the behaviour of the Society in certain matters had made impossible, it was rejected by a majority of 11 to 4. I was thus driven to a Minority Report, whose terms I was unable to discuss with those who had supported my Clause and who might have joined me to some extent in the opinions and recommendations I now submit.

Sir Horace Plunkett summarises his recommendations as follows :—

- (1) Insurance (as recommended by the Majority) to farmers against loss if called upon by the Government to grow special crops as an emergency measure.
- (2) Majority recommendation for maintenance of live stock endorsed.
- (3) Continuous cropping recommended upon small holdings.
- (4) Labour to be organised and mobilised through the agency of Labour Exchanges. No legislative action for raising wages until it is proved that labour does not get its full share of any increase in the revenue of the farmer. Temporary employment of refugees, prisoners of war, etc., to be considered.
- (5) Co-operative organisation to be encouraged; and, more especially, to be utilised in enabling small holders to acquire and use suitable implements and machinery.
- (6) A small joint Committee, consisting of representatives of the Department and the I.A.O.S. with an impartial Chairman, to co-ordinate State assistance with organised voluntary effort in food production, and to move the Government to take certain measures in regard to labour, the supply of agricultural implements and manures, and the provision of funds needed for the combined campaign of better farming and better business.

## REPORT (No. 4) ON THE STATE OF THE CROPS.

The closing weeks of September and the first half of October were very favourable for harvesting operations, and all the grain crops were saved and stacked in excellent order. In the middle of October, with the exception of occasional fields in very backward districts, the crop was all safely in stack or shed, and threshing has been proceeding briskly over most of the earlier counties. Stacking of the crops was carried out more expeditiously than usual, and the early completion of this brought most farmers well abreast of the work for the season. In many districts ploughing of stubble ground, preparatory to the sowing of catch crops as well as winter wheat and oats is general. Digging of the potato crop has begun on some farms, but will hardly be general till the end of October.

Reports received at the 14th October disclose the following particulars regarding the yields and prospects of the various crops:—

The wheat crop was well saved. Threshings indicate that the yield is good, especially from winter-sown fields.

**Wheat.** Spring wheat has not yielded so well, and quality is somewhat inferior. The average return might be put at 8 to 10 barrels per statute acre. The quality of the grain is generally good, though some samples show a high proportion of small and immature corn. Present prices range from 24s. to 25s. per barrel; for good samples growers are holding out for still higher rates, and the market has an advancing appearance.

Reports regarding the oat crop over the midland and southern areas state that yields are deficient. Winter oats in Co. Wexford has produced better than ordinary spring sown varieties. The oat crop in Ulster is stated to be very satisfactory, and is regarded as one of the best for many seasons. The crop as a whole was well saved, and the grain is coming on the market in splendid condition. Except on some very light soils there is a full average return of straw. Prices range from 12s. to 15s. per barrel in midland and southern markets, and from 11½d. to 1s. 1d. per stone in the Ulster counties.

The yield of barley is not up to the average of other seasons.

**Barley.** The bushel weight is light, and the produce will be about 10 barrels per statute acre. Quality is also somewhat deficient both in plumpness and colour of grain. Prices are good, and range from 21s. 6d. to 22s. 6d. per barrel. The larger proportion of the crop has already been threshed.

Rye has turned out a very fair crop, and the yield was a full average both in straw and grain. The crop was harvested early and under very favourable conditions.

The field bean crop in Co. Wexford is stated to be light, but is expected to yield well, as the plants were well podded. In the northern counties the crop has not turned out as good as was expected. Cutting of the crop is now being done, and some of it has been already saved.

Potatoes are generally described as an excellent crop, both as regards yield and size of tubers as well as eating quality. Though spraying was not so generally done as in previous years owing to the broken nature of the weather in July, there are little or no complaints of diseased tubers. Digging of the crop has started. The yield from the old Champion, where grown, is stated to be very disappointing this season, and the quality of the tubers very inferior. On the other hand, kidney shaped varieties, such as Up-to-dates, British Queens, etc., have given excellent yields. In one instance Up-to-dates have returned a yield of  $16\frac{1}{2}$  tons of marketable potatoes per statute acre.

The turnip crop has made much improvement during the past month. Fields look healthy, but many are very foul with weeds owing to the impossibility of drill-grubbing them in August. As a rule the earlier sown fields promise best.

There is every appearance of a heavy mangel crop. In common with turnips, the nature of the recent weather has been greatly in favour of this crop.

Cabbages have improved considerably of late, and promise to be a fair average crop.

Only a small proportion of the flax crop has yet been cleaned. The yield is variable; some growers consider it below average, while others regard it as better than could have been expected. Prices are exceedingly high, and range from 20s. to 23s. 9d. per stone for samples of good quality fibre.

Pastures are generally good, and carrying a promising amount of grazing for winter keep. There is an ample supply of hay and straw for fodder purposes, and advantage has been widely taken of the good weather to secure a larger amount than usual of second-cut clover

hay. The sowing of catch crops is receiving widespread attention, and those now over ground give excellent promise.

Live stock are healthy and thriving well owing to the favourable season. In some districts there has been an

**Live Stock.** unusual amount of hoose or husk affection among young cattle. Prices of fat cattle from 1st September have fallen from £2 to £3 per head, and the rate for store cattle also has declined somewhat in sympathy. Springing cows and heifers are scarce and dear. Dropped calves in some places are fetching £4 each, and four to five months old calves are also selling well at £6 10s. per head. Sheep are fetching good prices, and there is an extra demand for lambs. Pork prices dropped somewhat at the beginning of the month, and are now from 74s. to 76s. per cwt. (dead weight), but the market has a rising tendency. Young pigs, 8 to 10 weeks old, are in special demand, and fetching in some places up to £5 to £6 per pair. The result of this is that in some cases farmers have been encouraged to keep more sows to breed from next season. The supplies of turkeys are less than usual owing to the unfavourable character of the early summer. Geese numbers are if anything larger than usual. Reports from Co. Wexford state that London buyers have already secured their supplies of turkeys for the Christmas market. The prices paid for birds in some northern counties were from 12s. to 13s. per pair. Large numbers of geese reared in Co. Donegal were sold, and sent across channel during the month of September to be fattened for market.

The following is a detailed account of the condition and prospects of the crops in the various counties :—

### *Leinster.*

The quality of wheat grain is good : yields were variable and in the case of winter wheat averaged about 23 cwt. per

**Co. Carlow.** statute acre. Oats are inferior in quality ; yields were disappointing and are 3 to 4 barrels below last year's return : crops on lea were better than those on manured land : the return of straw is generally light. Barley, which is not much sown in some districts of the county, has given a poor return : the grain is bushelling light and the average yield on the best Barley lands is about 10½ barrels per statute acre. The potato crop is being raised : there are some reports of tubers being diseased but this is not general. Turnips were not good until recently ; they have, however, improved much of late and promise a full crop. Mangels are excellent. Pastures are exceptionally good and live stock doing well. Prices of fat cattle have dropped considerably of late. Owing to the



dearness of feeding stuffs, there is likely to be less stall feeding done this winter.

The grain crop has been harvested under satisfactory conditions, and is practically all now stacked in the haggards :

**Co. Dublin.** fields that were lodged which might have been damaged or lost were excellently recovered. Wheat reaped a fair crop : the small quantity threshed has yielded well. Oats is hardly yielding up to average : the grain is light owing to the want of sunshine in the early summer. Barley has not yielded as well as usual : the grain seems to have been affected by the adverse weather during ripening : the grain is light owing to the unfavourable conditions of growth in the early summer. Potatoes are yielding well and the crop is generally sound with the exception of British Queens. Turnips are mostly backward though there are occasional excellent fields. Mangels and field cabbage are good. Grass is plentiful on pastures but soft. Cattle have thriven well. Supplies of turkeys and geese are above average though the rains in the early summer prevented turkeys from thriving.

Wheat is under average in yield and there is a large proportion of small grain : the price at present being paid is

**Co. Kildare.** about 25s. per barrel. Oats, especially on lea, has not threshed out well and yields are decidedly under average : the straw has been well saved and is of excellent quality as fodder ; prices are good at about 14s. per barrel. The yield of barley is short but prices are abnormal—over 20s. per barrel and values still rising. Potatoes are not lifting as well as was anticipated and yields will hardly be average : there are very few complaints of disease. Turnips, where sown early, will be a good crop : many fields are very dirty as they could not be tilled during the wet weather in July. Mangels are a good average crop though some low-lying fields have been injured by the recent frosts. A good area of catch-crops has been sown this autumn. Pastures, owing to the fine autumn weather, is well covered and live stock in consequence have thriven well. Cutting of the after growth of clover has been very general and a large quantity of winter fodder has been secured in good condition. The recent fall in fat cattle values is disconcerting to those stock owners who have laid in store cattle at high prices. Supplies of turkeys appear to be more abundant than those of Geese this autumn.

Wheat was harvested in good condition : the crop is a good average and straw is abundant : prices run from  
**Co. Kilkenny.** 24s. to 25s. per barrel. The quality of oat grain is inferior and the yield is below average : White oats are threshing best ; Black Tartary is disappointing : prices

are in or about 11s. to 12s. per barrel. Barley is backward in yield and is bushelling fully 2 lbs. lighter than last year: prices range from 18s. to 22s. per barrel. Potatoes are a very heavy crop and free from disease: very few fields have yet been lifted. Turnips are a very fine crop: there are a few reports of Mildew and Finger-and-Toe attack. Mangels are a very heavy crop and free from crown disease. Cabbages are fair. Pastures are good and will carry cattle well into the winter. Prices for fat cattle have dropped some pounds per head recently: sheep are maintaining recent prices and lambs are fetching up to 45s. each. Fat pigs are bringing up to 77s. per cwt. (dead weight) and Bonhams are also paying rearers well. Turkeys and geese are not quite so plentiful as in former years.

Wheat was good and well saved and has turned out the best of all the grain crops: it is at present selling at 24s. per barrel. Oats are short in straw, but the sample of grain is sound and good: yields are about 9 to 10 barrels per statute acre: prices are from 12s. to 13s. per barrel. The return of barley is not up to average: the price is from 20s. to 21s. 6d. per barrel. Rye is good. Potatoes are a little above average: quality is hardly so good as in other years: there are some complaints of diseased tubers especially among Champions. Turnips are doing well but will hardly be a heavy crop. Mangels are exceptionally good though some reports state that bulbs are smaller than last year. Cabbages are bulking well. Pastures are good and stock thriving well. Beef cattle are lower in price: young stores still remain dear. Turkeys are up to the usual numbers. Geese appear to be scarce owing to the wet weather at rearing time.

The increased area under wheat has done well. Oats have been safely harvested: the grain is light but straw is a fair yield. Rye which is grown on boggy patches is good. Potatoes are excellent though some slight traces of disease attack are noticeable. Turnips and Mangels have grown well lately and are good. Pastures are much improved since August and cattle are now in good condition. Prices of stores keep a high level notwithstanding the depression in Dublin and the Cross-Channel markets. Milch cows are very dear and scarce. Fat pigs are showing good profits but pork is scarce. Bonhams are fetching locally £2 to £2 2s. each. Turkeys and Geese are plentiful.

Wheat, Oats and Barley have been harvested under favourable conditions: the one difficulty was in getting corn in condition to put together owing to the absence of drying winds and to heavy dews at night. Wheat yields run from 12½ barrels per statute acre down to slightly over six: prices are from 24s. to 26s. 6d. at present. Oats on lea land

have threshed out better than on manured land : the average yield is about 10 to 12 barrels per statute acre : prices opened at 13s. per barrel but have now advanced to as much as 17s. 6d. per barrel. Barley has been most disappointing in yield and is certainly over 4 barrels per acre beneath last year's average ; the average yield is about  $7\frac{1}{2}$  to  $8\frac{1}{2}$  barrels per statute acre : the market opened at 21s. per barrel but has now advanced to 24s. Potatoes will hardly be up to average except where well sprayed. Turnips have done well and should be a fair crop. Mangels look like gathering in a very weighty crop. Pasture is carrying as many cattle at present as can be remembered. Live stock are healthy. Turkeys are well up to the average in numbers ; Geese have gone out of favour to some extent and are not kept so generally as in previous years.

All the grain crops have been saved in good order and a large proportion threshed : yields show a considerable drop from past years : the quality of the grain is poor and due to the lack of sunshine in July and August : Straw is plentiful and of good quality for foddering purposes. The Potato crop is not lifting so well as was expected : in some districts old Champions are very rubbishy and poor : not much disease is reported except among this variety. Turnips are doing well and with a favourable autumn may reach last year's bulk. Mangels may be average. Cabbages are doing extra well and the crop is more promising than in other years. Pastures are carrying abundance of keep for this time of the season. Cattle, sheep and pigs are all healthy and selling well : there has been a slight drop in beef prices for the past fortnight. The demand for good forward polled bullocks has been very brisk and these are bringing higher prices than secondary beef cattle. Springing Cows are scarce and fetching good prices. The supplies of turkey and geese are moderate.

Wheat yielding fairly well, especially winter sown fields. Oats in general is only a medium crop and bad in many instances. Barley is yielding poorly and the return will be deficient. Potatoes promise to yield well and there is little appearance of disease among the tubers. Turnips, especially early sown fields, are good. Mangels will be a full return. Pasture is good for the season of the year and cattle are in forward condition. Turkeys are stated to be scarce in some districts ; there is a good supply of geese.

Wheat is threshing out well : spring sown fields were late in ripening and turned out poor both in yield and quality ; the yield may average about 10 to 12 cwts. per statute acre. Oats are threshing poorly and were allowed to get over-ripe in some cases ; White oats may be average but Black oats are deficient. Barley is giving

a bad yield of poor quality grain. Rye is only grown in occasional small plots and these are good. Potatoes in general are much above average in quantity; the quality in some varieties is deficient; some disease attack is noticeable in unsprayed plots. Turnips are now bulbing well especially early sown fields; late sown fields will not be average. Mangels are generally a good crop. Cabbages are doing well. Rape sown in June and July is only fair: catch crops sown in August and September are doing remarkably well. Pastures are well covered though grass on some is now beginning to show signs of failing. Live stock of all kinds are doing well and fetching remunerative prices though values have dropped considerably. There seems to be a plentiful supply of turkeys and geese.

Wheat is a good average crop, both winter and spring sown varieties, and should make  $7\frac{1}{2}$  barrels per statute acre all round; little threshing of the crop has been done. Winter oats is very good and giving a fine yield; Spring oats is rather light in sample and may be under average; Winter oats may average  $12\frac{1}{2}$  barrels and the spring sown crop 10 barrels per statute acre; the current price is 14s. per barrel. Barley is not yielding in proportion to straw; the grain is rather thin though the price is good—22s. per barrel; the yield may be about 10 barrels per statute acre. The field bean crop is light but the yield may be good as the stalks are well podded. Potatoes are a fair crop of medium quality. Turnips are growing well at present and promise to be better than average. Mangels are fair but not so heavy as last season. Carrots and cabbages are good. Pastures are keeping green and fresh. Cows have fallen back considerably in milk yield. Farm work is late for the season. Supplies of turkeys and geese are normal.

Wheat is not all carted yet; the portion threshed has yielded well and the quality of the grain is good. Oats is deficient in yield and quality especially Black Tartary: white varieties are very fair. The yield and quality of barley has been good. Potatoes are above average and good in quality: not much disease is to be seen. Turnips are rather small and backward and much overrun with weeds. Mangels are not up to average in point of size. Cabbages have done very well and the yield is above average. Pasture is excellent and stock have made a good thrive. Prices have been high though beef cattle have fallen off 10s. per cwt. in the past three weeks: shipping store

cattle have also dropped £2 per head in value. Milk yields are being well maintained. The prospective supplies of turkeys and geese are well up to the average.

### *Munster.*

Wheat was very well harvested : the grain is not as large as it should be in many places : quality is however good.

**Co. Clare.** Oats are a good crop and generally well saved : many grains are light and not well filled. Barley has given a fairly good return, but the bushel-weight is light. The small area of Rye grown was good. Potatoes are very little diseased especially where boxed : lifting is in progress and the yield is good. Early sown turnips are particularly good but late sowings have produced very little bulbs so far. Mangels are more than an average crop. Cabbages, carrots and parsnips are all satisfactory crops. Pasture is quite above average for mid-October. Cattle have done well until recently : demand is not good at present and prices are very much in favour of buyers. Dropped calves are fetching £4 each. Young pigs are fetching very high prices. Fat sheep and lambs are also selling well. Supplies of turkeys and geese are average in most districts.

A large proportion of the wheat crop has been threshed : yields are variable though generally good, in some cases

**Co. Cork.** reaching 10 to 11 barrels per statute acre ; prices are fair but disappointing : a good deal of the grain is being kept for home use. Oats are threshing out well : black oats are not yielding so well as white varieties : white oats are fetching 8s. per cwt. ; straw is plentiful and of good quality. Barley yields are hardly average but quality is good : the grain is somewhat smaller than usual : much of the crop will be kept for feeding purposes. The Potato crop is much above average in yield and the quality of the tubers excellent : disease is present to a very small extent : about half the crop has been raised. Early sown Turnips are a splendid crop : late sowings are not so good but expected to improve. Mangels are a fair average crop : some fields have already been pulled. Cabbages are good on the whole and have improved much lately. Catch crops in the form of Rape "Starters," Rye, Rye and Vetches have been largely sown during the past two months ; these crops are now making satisfactory growth. Grass is abundant for the season : clover after-grass has given an unusually heavy return this season and on many farms has been cut and made into hay. There is a considerable slump in the prices of fat and store cattle. Cows are milking splendidly for this stage of the season. Both fat pigs and bonhams are steady at recent rates. Sheep are easier for the past

month. Turkeys are more plentiful than last year in some districts : geese numbers are about average.

Wheat was well saved but little of the crop has been threshed yet: the yield promises to be satisfactory.

**Co. Kerry.** A good quantity of oats has been already threshed and is yielding from 18 to 20 cwt. per statute acre according to the quality of the land. Barley gave a good average yield in general, averaging from 10 to 12 barrels per statute acre: prices at Tralee ranged from 18s. to 19s. per barrel. Rye, where grown, did well and on dry deep bog land a good yield is expected. The potato crop is nearly all dug out and is a very good sound crop in general; there are very few or no diseased tubers in many cases. Turnips are making a great show of leaves and a satisfactory yield is expected. Mangels are doing well and will give a good average return. Cabbages are very fair. Pastures improved greatly for the past month. All kinds of stock are healthy and thriving: dairy cows are milking out well. Young and store cattle are somewhat down in price of late: the chief demand is for springing cows and weanling calves. Pigs appear very plentiful just now: Pork is fetching from 75s. to 78s. per cwt. Turkeys and geese, while not scarce, were often more plentiful at this time of the season.

Wheat has been all harvested: some threshing has been done and the returns were good: the grain is of good quality.

There is a slight deficiency in the bulk of grain

**Co. Limerick.** from the oat crop: the corn is not very plump and is yielding rather light: White oats is fetching 1s. 1d. to 1s. 1½d., Black oats 11½d. to 12½d. per stone, but prices have a rising tendency. Barley which is not much grown except for feeding purposes is short in straw: the grain return is fair. Rye has yielded well both in grain and straw. Potatoes are a good crop all round and digging is in full swing: yield will hardly be as good as last year: there are a few complaints of disease from some districts. Early sown turnips promise well but those sown late are not so good: the crop is rather weedy and grassy everywhere: there have been a few cases of Finger-and-Toe attack. Mangels are a good crop and up to the average. A large area of catch crops has been sown and these are doing splendidly. Grass is plentiful and there is plenty of keep for stock. The latter are healthy and doing well. Cows kept up their supply of milk splendidly. Prices for all kinds of stock have been on the down grade for the past month. Pigs are paying well and on some farms extra sows are being kept to breed from next year. Geese and turkeys in some districts are somewhat scarcer than usual owing to mortality among the young birds in spring.

Threshing of the wheat crop is in operation : yields are not up to average though winter sown fields have done best.

**Co. Tipperary.** Not much of the oat crop has been threshed yet : yields so far are not up to expectation : the grain is badly tilled and the straw short : prices in Thurles range from 12s. 6d. to 14s. per barrel. Except on good land barley has yielded below average with a short return of straw : nearly the whole of the crop has been threshed : prices in local markets have advanced to 24s. per barrel. Potatoes promise everywhere a very good yield with excellent quality : digging has been started but is not yet general : there are few diseased tubers to complain of. Early sown turnips promise well : late sowings are average but have come on well of late. Mangels are generally a fair sound crop. Cabbages are uniformly good over the county : the season suited late planted fields. Pasture has a good sole with a fine growth of after grass. Cattle of all description are in good condition : fairs are large and stock coming down in price : milch cows are doing well though some owners complain that a shrinkage is already apparent in the milk supply. Bonhams are keeping dear. Turkeys and geese from one cause and another are not so plentiful as in other years.

Most of the wheat crop has been threshed and sold at 25s. per barrel : the balance of the crop is being kept for home use. **Co. Waterford.** Oats was a thin crop and gave a disappointing yield : the grain was somewhat discoloured and light : straw is small in quantity but of good quality ; present price is about 14s. per barrel. Three-quarters of the barley crop has been sold at from 18s. 6d. to 21s. per barrel : the remainder is being held over for consumption on the farms : the yield was fair. There is an excellent crop of potatoes where planted early and spraying was attended to : there are some complaints about the softness of late varieties : all sorts are good except Champions which are described as a rubbishy lot : there are not many diseased ones. Turnips and mangels are both growing strongly : storing of the latter crop has begun. Pastures are extra good : aged beef cattle have dropped fully £3 to £3 10s. per head since mid-September ; young growing stores have gone down from 4s. 6d. to 6s. per cwt. live weight. Sheep and lambs were selling well until recently but are somewhat weaker of late. Pigs, both store and fat, have made profitable prices during the year and in consequence young pigs are plentiful in the county : bacon pigs are bringing from 57s. to 61s. per cwt. live weight. Turkeys are not so good as in former years : the July rains told against the growth of the young birds. Geese are reported to be plentiful, and the birds heavy and of good quality.

*Ulster.*

Wheat where grown was secured in excellent condition and generally is a very fair crop. Oats are very good and **Co. Antrim,** well saved: the crop is threshing well. The small patches of Rye were well saved. Potatoes are a very fine crop though yield may be hardly as good as last year; the quality is satisfactory: in a few districts there are some complaints of diseased tubers. The Turnip crop has grown well since July and should return a fair yield; fields are bulbing well now. Mangels are not so heavy as last year but the crop is a good one. Cabbages are fair: Carrots and parsnips are good. Flax has been a variable crop: there was some difficulty in securing the crop owing to the wet period while it was on the grass: opening prices are very encouraging. Pasture is holding out well: husk or hoose has been very prevalent among young cattle this autumn: Milch cows are failing fast in their milk. Prices for all kinds of stock are not so good as they were some time ago. Turkeys and geese are likely to be plentiful.

Wheat is very sparingly grown: the small plots under the crop were well saved. Oats are nearly all secured **Co. Armagh,** in good condition and will be average: machine owners say the yields are not so good as last year. Rye was a difficult crop to save: there was damage from discolouration in some cases. Potatoes will not yield, it is believed, as well as last year: very little digging has been done yet. Turnips are growing out well and should finish an average crop. Mangels are moderate. Cabbages are a very fine crop. The yield of Flax will not be good, especially where grown on poor hilly land: very little scutching has been done yet; prices are high, up to 22s. and 23s. per stone. There is plenty of keep on pastures: grass is holding out well: cattle have been thriving extra well for the past month but prices have dropped recently and all kinds of stock except milch cows are difficult to dispose of. It is probable that turkeys will be more plentiful than geese this season.

Wheat was a very good crop and very well saved: there were more plots grown this year than usual. Oats are a splendid crop and is milling well: the quality of both **Co. Cavan,** grain and straw is excellent. The small plots of rye on light moory soils appear to be over average. Potatoes are an excellent crop and there is little disease so far: the quality of the tubers is prime: digging is not far advanced yet. Turnips are uneven: some fields are good and some very indifferent. Mangels are on the whole a good crop as also are cabbages. Catch crops would have been more widely grown but for the lateness of the harvest. Flax in general is turning out a good crop: there is not much grown



in the county. Pasture lands are grazing well since the rains : in some cases they are said to be getting bare. Trade in cattle at fairs is slack. Milch cows are yielding freely ; good prices for all kinds of stock are being well maintained except for forward store cattle. Young pigs and young cattle as well as springing cows are especially dear ; young pigs are fetching £3 10s. to £4 5s. per pair. Turkeys are more plentiful than last year and are fetching 12s. to 13s. per pair. Geese supplies are about the same as other years.

The wheat crop has been well saved : the yield of winter sown plots is well up to average ; some plots of spring wheat were rather thin and late in ripening ; the grain is of good quality. Oats are a good crop and above average : the sample is excellent ; there is a good yield of straw. **Co. Donegal.** The field bean crop will scarcely reach the average in yield but has been saved in good order. Potatoes are above average in yield and eating quality : there are very few diseased tubers so far : digging of the crop has just begun. Early sown turnips are a very good crop : later sowings are very backward and have much growth yet to make to be average. Mangels are a good average crop. Cabbages have improved considerably and are average in bulk of feeding. Not much scutching of the flax crop has been done yet : in a good many cases the yield is poor but the quality of the fibre is superior. Pasture was good especially at the end of the season. Store cattle prices are not quite as high as recently : fat cattle and fat sheep are still selling dear. Pork is fetching 74s. to 75s. per cwt. Turkeys are plentiful and the birds are large and strong. Most of the geese have been sold in September and sent to England.

The wheat crop is practically all in stack and was secured in excellent order. The Oat crop is considered to be the best for years, and was splendidly saved : little threshing has been done as yet. **Co. Down.** The small area of barley grown turned out well. Raising of the potato crop is general : the yield is not so heavy as last year, but tubers are sound and of good quality. Turnips and mangels show good promise : some fields of the former crop were affected with mildew. Cabbages are a bulky crop. Flax is yielding better than was expected and there are record prices. Pastures are good. There are some good flocks of turkeys, but these are absent this year on many farms which usually have them. Geese are perhaps more plentiful than usual.

Wheat is an average crop of grain and straw and was all well saved : there was a considerable increase in the number of plots grown. **Co. Fermanagh.** Oats are a very heavy crop and the yield is better than for many years. Rye is good. Potatoes are yielding well over average and there are

very few diseased except among Champions which are a very poor crop compared to other varieties. Turnips are growing out well and fields on dry sandy land are good ; on heavy soil the crop is foul and choked with weeds ; yield are certain to be deficient. Mangels also are only good on very clean land. Cabbages are disappointing. Flax was of fairly good length ; yields are variable ; quality is fair ; prices are high. Pastures are giving a good return and cattle are advancing in condition. All live stock, especially springing cows, are fetching high prices : stores and fat cattle have fallen 20s. to 30s. per head within the last month. Young pigs are very dear—£5 per pair. Turkeys are scarce but geese are very plentiful.

Wheat is not much grown : the crop was saved in good order.

Oats turned out a first-class crop and has been cut  
**Co. Londonderry.** and stacked practically without a shower ; where threshing has been done, the yield is considered good ; prices are about 1s. 1d. per stone. Beans have not turned out as well as they once promised : stalks were not podded as heavily as usual. Potatoes are digging out a heavy crop and are especially good where sprayed ; some fields have been already dug out and pitted. Turnips and mangels look healthy and will pull a fine crop ; some fields are very dirty with weeds. Cabbages are bulking well and promise a large amount of feeding for stock in the autumn. There are some good crops of flax : yields are satisfactory and prices are higher than can ever be recalled. Pasture has lasted out well but is beginning to fail now. Prices of store and beef cattle have dropped considerably. Turkeys and geese appear as numerous as in other years.

Winter sown wheat was saved in good condition and in general is a splendid crop ; spring sown varieties ripened  
**Co. Monaghan.** very late and will give a low yield. Oats are a record crop as regards bulk of straw : the crop was well saved though some fields were very late of being cleared ; not much threshing has yet been done. Potato digging has just begun : the yield is fairly good but hardly up to last year's average : this is especially so of the Champion variety ; a fair proportion of diseased tubers is reported on heavy soil. Turnips are doing exceptionally well at present : some fields are very good and others poor. Mangels are medium. Very little flax has been scutched yet ; yields are stated to be poor ; prices are high—up to £1 per stone. Pastures have done fairly well of late ; cattle are in good condition and dairy cows are milking up to average. Prices for all kinds of cattle though still high are showing some reduction. Young pigs are plentiful and the demand is easier in consequence. Finished pork is making good prices. Geese

are about average in numbers ; the comparative supply of turkeys varies in districts.

Wheat cut a good crop ; it was well headed and saved in prime condition ; the yield is satisfactory. Oats are over

**Co. Tyrone.** average especially on land in good condition ; the crop was stacked in splendid order ; prices are good and look like advancing. Potatoes are an average crop of extra good quality : the yield is not so heavy as last year ; kidney shaped potatoes cropped best ; round-shaped varieties like Champion and Skerries are a light yield. Turnips are poor for the time of year and will require to bulb out considerably yet to be average. Mangels did well from the start and are from medium to good. Cabbages are excellent. Flax is stacked in good order ; yields are stated to be poor and uneven ; prices are high—up to 23s. per stone already. Pasture is good for the season and cattle have done extra well for the past two months. Beef cattle are not selling so well ; Springers are dear and scarce. Pork is fetching a high price. Turkey and geese numbers are about the same as in other years.

#### *Connaught.*

Wheat turned out a good crop and was safely harvested. Oats gave a good yield of grain and straw and was well

**Co. Galway.** saved. Rye was harvested early and is an average crop. Potatoes are excellent : the digging out of the crop has not yet commenced ; there are some complaints of disease on certain types of soils. Turnips are very weedy and largely grown to tops. Mangels are average to good. Cabbages are a satisfactory yield. Pasture is excellent and live stock have done well owing to a plentifulness of grass. Cattle have dropped in value but are still selling at a fine price. Supplies of turkeys and geese are about the same as in other years.

Both winter and spring wheat have yielded well in grain and straw, and ripened satisfactorily even in the later

**Co. Leitrim.** districts and was harvested under good conditions. Oats have given a better return than was expected and the crop is above average in grain and straw. Barley gave a good return of grain though straw was light. Rye is well above the average both in respect of grain and straw. Potatoes are yielding an exceptional crop with practically no diseased ones. Turnips have done well for the past month and a good average yield is expected ; late sown fields have not bulked so well as those sown earlier. Mildew and crown rot have done injury in some districts. Mangels are a good crop and well over the average. Cabbages are returning a fair average yield. Flax (in Ballina district) is giving a much

heavier return of retted straw than last year : the small quantity already scutched has yielded well. Pasture is carrying a full quantity of stock and is growing better than it did last June. Store and beef cattle have fallen greatly in value for the past month. Springers and milch cows are fetching a good price and supply appears as not being equal to the demand. Sheep are also selling well. All classes of pigs are fetching high prices especially young pigs—£6 per pair. Geese are fairly plentiful but turkeys are scarce as many young birds died from diarrhoea and gapes in spring.

Wheat was a satisfactory crop : the yield of grain was good, some plots producing at the rate of 30 cwt. per statute


**Co. Mayo.** acre : prices are good. The Oat crop was well harvested : the return of grain is good ; any lots

sold have brought 1s. per stone ; straw, although light in some districts, is of good quality. Barley has given a good return of grain and was harvested in fine condition. The yield of Rye is satisfactory : the crop is not much grown. Digging of the Potato crop has begun in the earlier districts : the yield is not up to the expectations of many but the quality is good ; there have been some complaints about the Champion variety. Turnips have grown well of late and promise to be an average crop. Mangels also promise a full return. Cabbages are a heavy yield. Pasture is plentiful on all classes of soil. Live stock are numerous on all farms and in good health. Sheep and cattle prices are lower. Pigs are selling well. The supply of turkeys will be short, and geese are not so plentiful as in past years.

Wheat was a fairly good crop and saved in splendid condition.

Oats will be a fair average. Rye is not sown

**Co. Rosecommon.** extensively ; the few plots grown cropped well.

 Potatoes are now being raised : they are a splendid crop with very few diseased ones amongst them. Turnips are very good where sown early : later sowings are backward. Mangels will be over average. Cabbages are fairly good. Pastures did well in the recent mild weather and are carrying a good crop of after-grass. Cattle thrive well for the past two months, though prices are down £2 per head. Sheep prices are encouraging. Turkeys are scarce. Geese seem to be as numerous as usual, some farmers having as many as thirty in a flock.

The yield of grain and straw from wheat, especially the winter sown crop, was over average : all was safely

**Co. Sligo.** secured ; little threshing has yet been done. Oats

are a much heavier crop than last season : it was well harvested ; the grain is plump and of fine colour. The yield of barley is good and the grain of good quality ; the market price is

18s. 6d. to 19s. 6d. per barrel. Rye has been a very fair crop but is little grown. About one-fourth of the potato crop has been lifted : the yield is good but under the average of the past two years ; the proportion of diseased tubers is small ; a large share of the Champions are of unsaleable size. Turnips look well ; if they get good weather in November the crop should be above average. Mangels did well considering the wet season : the yield should be well up to average. Cabbages have done well for the past month. Catch crops which have been sown in an increased area—principally Vetches and Rye—are growing fast. Pasture is abundant. Live stock are healthy though complaints of husk or hoose attack on young cattle are numerous. Prices of cattle have dropped greatly and there is a general dullness of trade. There appears to be an average supply of turkeys and geese.

## FRUIT CROP REPORT (No. 2) SEASON 1915.

The following summarised paragraphs serve to supplement the Fruit-crop Report published at mid-July, and to furnish particulars regarding the season's yield of tree fruits. This report is based on statements which have been kindly supplied by a number of correspondents in each county.

The continuous rains throughout July and the first half of August delayed the growth of most tree fruits. Trees, however, responded well to the improved weather conditions that set in after this stage, and were favoured by the warmth and sunshine which served to develop size and colour in the fruits. On the whole this may be described as a good fruit season, and there was an absence of heavy winds which usually cause a considerable quantity of fruit to fall off and become injured. The earlier varieties of tree fruits are described as deficient in flavour; later varieties which benefited by the fine weather in September are stated to be full-sized and well flavoured. Prices for all kinds of fruit are low except for the choicer dessert varieties of apples and pears. The extra yield of fruit and the dearness of sugar, which restricts the amount of jam that otherwise would be made, partly accounts for the slackness in demand. A considerable amount of the later season varieties of fruits are being held over and kept off the market in the expectation of higher prices when the existing heavy supplies have been cleared.

### *Leinster.*

Apples on the whole were a heavy crop. Pears were under average though the quality was good. Plums

**Co. Carlow.** cropped satisfactorily, and damsons were extra heavy. Figs and peaches outdoor were good.

The fine weather since the middle of August made a great improvement on the size and colour of fruit, especially on such apples as Bramley Seedlings, Peasgood, Nonsuch and other large growing varieties. Insect pests in the latter part of the season were not so troublesome as usual. The principal fungoid attacks—mildew and scab—were much in evidence in some places and on old varieties. Marketing facilities are poor, and local buyers give low prices for whole orchards. Apples sold in barrel brought from 1s. to 3s. 6d. per 120; some really fine fruit sold at 1s. to 1s. 6d. per dozen.

Apples turned out a heavy crop of good sized clean fruit. Pears were rather poor. Plums gave a full crop of

**Co. Dublin.** nice fruit. Damsons were very good but late in ripening. All fruit developed rapidly in size since August. Red spider did much damage on some of the pear

trees. Prices for all kinds of fruit were fair except apples, which brought only a moderate price.

Apples were the heaviest crop for the past twelve years, and the fruit clean and good though rather late in finishing. Some varieties have coloured splendidly; of the cooking sorts, Bramley's, Newton Wonder, Lane's Prince Albert and Grenadier did best. Among dessert varieties Allington Pippin was undersized and spotted; James Grieve and Worcester Pearmain did well. Pears were a good crop in some places, in others only fair; some fruit was badly scabbed. Plums were a heavy yield in some aspects, but flavour was deficient. Damsons bore a heavy crop; fruit in some cases was undersized. Loganberries and wineberries carried excellently. Fruit coloured out well in September. Attacks from insect and fungoid pests were slight. Apples brought from 7s. 6d. to 15s. per barrel in Dublin market. There has been an offer of £10 per ton made for apples to be delivered in England in December. Pears sold well at from 1s. to 4s. per dozen for good fruits. Damsons brought 2s. 4d. per stone.

Apples were a good average crop and of fine quality. Cooking varieties did best; Beauty of Bath cropped best. **Co. Kilkenny.** heaviest of the dessert varieties. Pears were average. Plums and damsons were the best crop for some years. On the whole it was a first rate fruit season. Insect pests were few; fungoid trouble was, if anything, worse than usual, especially on apples and pears. Prices ruled better than last year. Good apples sold for 4s. 6d. per 120; fruit from old orchards was hard to dispose of.

Apples were a heavy crop though the fruit was smaller than usual. Pears were an average return of good fruit. Plums and damsons cropped heavily, but the fruit was medium in size. The latter part of the season suited the ripening of the late fruit crop. Aphis and American blight were the most troublesome insect pests; wasps also caused some damage. Apple and Pear scab were the only fungoid troubles. Prices were poor in local markets owing to over supplies.

Apples are an excellent crop and colouring well; the best cropping varieties have been Bramley's Seedling, Newton Wonder, Golden Noble, and Lane's Prince Albert; **Co. Longford.** the fruit is of excellent quality; a wind storm on October 7th destroyed a good deal of the prime fruit. Pears

are average ; the fruit is not so large in size as other years. Victoria plums were an extra crop. Damsons also were heavy, many going to waste on the trees. Aphis attack this season was severe on plums and damsons, and American blight made its appearance in some orchards. Damage from the Codlin moth was also in evidence. Bramley Seedlings are being sold locally at from 2s. 6d. to 3s. per cwt. Large selected apples sold at from 4d. to 6d. per dozen.

Apples are heavier than usual, though in some districts the crop is light. Pears are about average. Plums

**Co. Louth.** were rather above the average. Damsons were a short crop but of good quality. All fruits favoured by the good weather at the close of the season matured well. Local markets suffered from glutting. Damsons and plums sold at 2s. per cwt.

The apple crop was heavier than usual and of good quality.

Pears were about an average yield. Plums and

**Co. Meath.** damsons were both good crops, though in some cases the latter were somewhat deficient ; quality was, however, good. All fruit ripened out well during August and September. Apple spot damaged many apples, and the American woolly aphis caused much fruit to be cramped in size. Large growers sent to Dublin and Belfast markets, and others to Liverpool and Manchester ; the smaller growers supply local demands. Apples sold at 2s. 6d. to 4s. 6d. per bushel according to quality ; local prices were from 8d. to 5d. per dozen. Plums fetched 4s. to 6s. per bushel and damsons 2s. per bushel. Pears brought 8d. to 10d. per dozen.

There was a good crop of medium sized fruit on apple trees.

Pears cropped average, though the earlier varieties

**Queen's Co.** were injured by May frosts. Plums were a good crop of late ripening but full sized fruit.

Damsons also were plentiful. Apples and pears were at a standstill owing to the cold in August ; the fine weather in September helped them to ripen off well. Aphis and leaf-eating caterpillars were very troublesome during July and August.

Apples finished an excellent crop both in size and colour ; varieties such as Bramley's Seedling, Newton Wonder, and

**Co. Westmeath.** Lane's Prince Albert were much above the average.

Pears were average in the open, but very good on walls and on sheltered situations. Plums gave the heaviest return for many years ; on cold situations the crop was not so



good. Damsons were also exceptionally plentiful on trees, but the fruit was not so large as in other seasons. It was a great season for Crab apples, which in some cases were used for pig-feeding. The only trouble from insects came from wasps which did much injury to plums. Apple and pear scab was very common, and even affected wild crab apples. Selected apples sold at 7d. to 10d. per dozen; pears 1s. to 1s. 3d. per dozen; plums 4d., and damsons 2d. per lb.

Apples were below average. Pears also were poor. Plums gave a fair yield. Damsons are little grown.

**Co. Wexford.** The unfavourable weather during July caused a serious check to the development of tree fruits. The quality is poor, and much of the fruit is scabby. Apples are selling locally from 3s. 6d. to 6s. per 120.

Apples were a fair crop, though much of the fruit was small and disfigured with scab; Cox's Orange Pippin and

**Co. Wicklow.** Blenheim were fairly free. Pears were a good crop of nice clean fruit. Plums were a ~~heavy~~ yield, especially Victorias. Damsons were average. The fine weather of September ripened and finished well all late tree fruits. American blight was observable in some orchards. Canker and Black Scab were prevalent in some localities. Prices were low owing to over supply; apples sold locally at 6d. to 1s. 3d. per dozen; inferior fruit brought 2s. 6d. per 120. Pears fetched 1s. to 1s. 3d. per dozen according to quality. Plums 4d. to 5d. per lb.

#### *Munster.*

Apples on the whole finished off a very heavy crop of very good quality fruit. Cox's Orange Pippin cropped and

**Co. Clare.** coloured extra well; Allington Pippin, Worcester Pearmain, Bramley's Seedling and Lord Derby were all very satisfactory yielding varieties. Pears were an unusually heavy crop of fine quality. Plums and damsons bore a good crop on all varieties. Woolly aphis does not seem to have been so much in evidence as usual. Apple and pear scab were favoured by the gloomy weather of August; canker was not so much noticeable. The demand for dessert apples has been very good up to the present; cooking apples were almost unsaleable at very poor prices. Prices: Dessert apples 5d. to 8d. per dozen; Cooking apples 6d. per dozen; Pears 8d. to 1s. 6d. per dozen according to size and quality; Plums 3d. to 4d. per lb.

Apples are only medium and much beneath last year; Bramley's did best; the fruit finished up well but was not

**Co. Cork.** so large or as well coloured as in other seasons; generally speaking the bulk of the fruit is of good quality. Pears are a fair crop, deficient in flavour and ripening rather unevenly. Plums did well. Damsons were above average. Codlin moth was not so troublesome as usual; apple scab was very prevalent on Allington Pippin and a few other varieties. Markets are well supplied, but the demand for good dessert apples exceeds the supply. Prices compare favourably with other years. Well graded apples are bringing from 7s. to 10s. per hundred. Pears of good quality sold at 20s. per hundred.

Apples are a good average crop of large well coloured fruit; the crop did not develop till the end of August and

**Co. Kerry.** during September. Pears both on wall trees and standards carried a heavy crop, well coloured and flavoured. Plums were good; the crop is not much grown in the open but chiefly on walls. Wasps were a serious pest this season; aphid was more troublesome than usual. Apple scab was very prevalent on apples; canker caused some injury in several orchards. Cooking apples fetch 2s. 6d. per 120; best dessert apples 1s. to 2s. 6d. per 120; pears average 1s. per dozen.

There is a good crop of apples, and pears are well above average.

Plums gave a heavy yield, but are not much grown. All fruit coloured well at the end of the season, but the crop was later in ripening than usual. American blight is very prevalent in some districts; Codlin moth did harm in some orchards. Fruit on old trees was injured by the Black Spot Fungus. Apples are selling locally at 1s. 3d. to 2s. per hamper of 2 stones; pears 2s. to 4s. per hamper; plums 2s. 6d. to 3s. 6d. per stone.

Apples are a good crop in most parts of the county. Pears also are plentiful on trees. Plums cropped extra well.

**Co. Tipperary.** Damsons are not much grown. Aphid was very troublesome in the early part of the season, and wasps caused a considerable amount of damage to ripe fruit. Apple scab is very prevalent this season; Allington Pippin and Newton Wonder were both badly affected. Not much fruit has been sold yet; the main crop still remains to be marketed. Local prices were good. Cooking apples 8s. to 10s. per cwt.; dessert apples 1s. to 2s. per stone. First class quality Plums 3s. per stone. Damsons 2s. per stone.

The apple crop is very good, though not quite so heavy as last year; the fruit, however, is much larger and of finer colour particularly on young trees. Pears are not so numerous as last year, but are larger and of good quality. Plums were a very heavy crop, but the fruit was smaller than usual. Damson yields were up to average. American Blight affected some of the older fruit trees, and canker is also to be seen on some trees. Only the surplus fruit is sold locally, though some growers send consignments to Dublin. Good apples sold well, but old-fashioned varieties are hard to dispose of at any price. Apples brought locally 3s. to 7s. per 120. Pears from 5s. to 15s. per 120 according to size and quality.

### *Ulster.*

Apples were a good crop, especially the eating varieties; the quality of the fruit was poor in old orchards.

**Co. Antrim.** Pears were poor except on walls where an average crop was obtained. Plums and damsons were a heavy yield and of good quality. Green fly was the worst insect pest. Apple scab was the troublesome form of fungoid attack. Prices for fruit were low. Apples sold at from 4s. to 9s. per cwt. Fruit of select quality like the Bramley variety is being held over. Plums are fetching 2s. to 3s., Damsons 6d. to 1s. 3d. per stone.

Early varieties of apples such as Early Victoria, Grenadier, Royal Codling and Lord Derby carried an average crop

**Co. Armagh.** of fair quality; Bramley Seedling, which is the principal variety grown, is below average, undersized, and the quality bad. Pears are only sparingly grown and are a light crop. Plums are a thin crop generally. Damsons are very variable; in some districts the crops are heavy, in others the trees are almost bare. Apple scab was very prevalent, especially on Bramley's. First grade apples are sold locally at 8s. per cwt., second grade 4s. per cwt., boilers from 1s. 6d. to 3s. per cwt. Plums brought 8s. to 10s. per cwt. Damsons opened at 10s. per cwt. but gradually fell to 5s. and later to 3s.

The Apple crop this season was satisfactory; trees on low-lying positions did not yield so well. The yield from

**Co. Cavan.** Pears was variable; trees on walls bore average crops. Both stone fruits—Plums and damsons—gave excellent yields, though in some districts trees bore sparingly enough. Insect pests were hardly so injurious as in other seasons. Wasps did much harm to fruit at ripening time. Apple scab and canker were the only fungoid attacks met with—and these chiefly in old orchards.

Apples are slightly over average both in quantity and quality.

Pears were a very good crop. Plums turned out an average yield. Damsons are very little grown.

There has not been much complaint regarding insect and fungoid attack, though wasps did much injury to ripe apples and pears. Most of the fruit grown is sold locally, and chiefly to military camps.

Apples are a heavy crop; the fruit is clean and well coloured.

Early varieties finished well; Early Victoria, Grenadier, Beauty of Bath, Lady Sudley and

Worcester Pearmain did best. Lord Derby, Bismarck and Lane's Prince Albert are carrying good crops; Bramley's Seedling is also yielding well, but the fruit is not so large this season. Pears are light, though the quality is good on well-trained trees. Plums were a heavy crop, but the fruit lacked flavour and colour. Damsons are average and the quality very good. Aphis and American Blight were the commonest forms of insect attack. Black spot fungus was very prevalent on the Bismarck variety of apple. Pears were also affected. Prices in Belfast for early dessert varieties such as Beauty of Bath were from 18s. to 20s. per cwt.; early cooking varieties 9s. to 12s. per cwt. Pears ranged from 10s. to 30s. per cwt. Victoria Plums 10s. to 16s. per cwt. Damsons 5s. to 8s. per cwt.

Bramley's are good in a few places, while in low-lying situations the crop is very short. Grenadier and Lane's

Prince Albert are good generally. Pears are above average especially on walls. Plums are under average in quality and in yield are light to fair; Victorias did not colour well this season. Damsons are under average. Insect pests have been less in evidence than usual. Apple scab, especially on Bramley's, was very prevalent. Beauty of Bath apples fetched 6s. to 7s. per bushel on the Dublin market; Grenadiers sold at 11s. to 13s. 6d. per barrel. Boiling apples sold locally at 2s. 6d. per cwt.

Apples are a good crop; the fruit is smaller in size than it should be and a good deal spotted; the flavour and

quality, however, is excellent. Pears are better than usual. Plums were so variable that it is difficult to say whether the crop has been average. Damsons were very poor. Insect pests were not so troublesome as in other years. Fungoid attacks were very common even in well sprayed gardens. Prices are low. Best cooking Apples only fetched 1s. per stone, and dessert varieties 1s. 6d.

In the northern portion of the county the apple crop is well over the average. Pears are average to bad.

**Co. Monaghan.** Plums carried a very prolific crop. Damsons were good generally. Apple sucker was not so observable this year. Scab was very prevalent on apples and injured much of the fruit. Canker is being kept well under control. Early apples brought 10s. to 15s. per barrel; Bramley Seedling has not been sold yet. Small and otherwise inferior apples sold at 2s. 6d. per cwt. Some good pears brought 1s. per dozen locally; small sized pears 1s. to 1s. 6d. per stone. Victoria plums averaged about 6s. per cwt. Damsons opened at 9s. per cwt, but gradually fell to 2s. at mid-October when growers ceased to pull any more fruit.

Apples are over average and the quality very good; Bramley Seedlings are extra heavy; the fruit is perhaps

**Co. Tyrone.** a little smaller than usual. Pears are about average. Plums are more variable in yield; the fruit is rather undersized; the crop did best on walls. Damsons also are variable, but the fruit is large and fine. Insect pests were not so troublesome as usual; the chief of these were American blight on apples and Pear Midge on pears. The chief fungoid attacks were silver leaf on plums, canker on apples, and black spot on both apples and pears. There is a fair local demand for all fruit. Good apples are bringing from 8s. to 16s. per cwt. according to quality. Small apples are bringing 2s. per cwt. for cider manufacture. Pears are bringing 8s. to 20s. per cwt. Plums sold at 3s. to 8s. per cwt.; Damsons at 4s. to 8s. per cwt.

#### *Connaught.*

Apples are an excellent crop of good-sized and well-covered fruit especially the late varieties:—Bramley's, Golden

**Co. Galway.** Spire, Newton Wonder, Cox's Orange Pippin and Lane's Prince Albert did best. Pears are good; the fruit is full-sized and well coloured; late varieties are ripening well. Plums and damsons were a heavy yield but not much grown. American blight and aphid were more troublesome than usual. Apple scab did much damage in some orchards; canker was also bad in places. Bramley seeding apples have been fetching 7d. per doz.; mixed apples 9s. per cwt. Damsons 1s. per stone.

Apples were a good crop on most trees, and late varieties are ripening well; Cox's Orange Pippin did extra

**Co. Leitrim.** well this season. Pears are a fine crop and ripening well. Plums were a good yield. Wasps injured the fruit very extensively this year. All fruit is marketed locally.

Apples were a very good crop except in some districts; the fruit in most cases is of fine quality; the mid-season varieties ripened much later than usual, and on such trees the fruit is still growing. Pears were uneven; late varieties did best. Plums and damsons were a record crop. There has been little trouble from insects or fungus attacks, though wasps did a considerable amount of injury. Good apples sold locally at 1s. 6d. to 2s. per stone; pears of fine quality at 1s. per doz., and plums at 4d. per lb.

Apples were an excellent yield and finished well, though the fruit was not so large as in previous years; **Co. Roscommon.** Bramley's Seedling and Newton Wonder are particularly good, clean and well coloured; Lane's Prince Albert rather small; Worcester Pearmain and Lady Sudley large and good. Pears were a good crop, and the fruit much larger than usual; Doyenne du Comice was particularly good. Plums were a very heavy yield, almost all varieties bearing equally well. Damsons were a large crop where grown. Insect attacks were of no consequence this season; apple scab did much injury to some varieties of apples, principally Bismarck and Lord Derby; canker also affected some trees. Apples are selling from 10d. to 1s. 6d. per stone; choice dessert varieties are fetching 6d. to 10d. per stone the better quality of late keeping apples are being held over in most cases. Large pears are bringing 1s. per dozen.

Apples are a good crop and have finished up well; the most satisfactory varieties have been Bramley Seedling, **Co. Sligo.** Newton Wonder and Charles Ross. Pears were a heavy yield, but the quality was not so good as usual; the best croppers were Fertility and Dr. Jules Guyot. Plums did well, but are not much grown; the Victoria variety cropped heaviest. Apple scab and some canker are the only diseases very noticeable, and neither are very prevalent. Prices were poor for early apples, 6d. to 10d. per stone; they have since advanced to 1s. 6d. to 1s. 10d. per stone. Pears are selling freely at 1s. to 1s. 6d. per doz. Plums 2d. to 4d. per lb. Damsons 2d. to 3d. per lb. There is a considerable quantity of late keeping fruit still on hand which is expected to sell well.

## REPORT OF THE THIRD IRISH EGG-LAYING COMPETITION.

By MISS L. MURPHY, *Munster Institute, Cork.*

The Third Irish Egg-Laying Competition conducted by the Department of Agriculture and Technical Instruction for Ireland was held at the Munster Institute, Cork, from 1st October, 1914, to 31st August, 1915.

As in the previous year, before the pullets were received, the houses were thoroughly cleaned and whitewashed.

**Preparation of Houses and Runs.** The runs were mown bare and treated with freshly slaked lime, so that the birds' quarters were in good condition on the day of their arrival (23rd September, 1914) and remained so to the close

of the test.

The following breeds and varieties competed :—

	White Wyandottes	..	12	pens.
<b>Breeds</b>	Rhode Island Reds	..	9	"
<b>Competing.</b>	Buff Orpingtons	..	4	"
	White Leghorns	..	3	"
	Brown Leghorns	..	2	"
	Black Minorcas	..	2	"
	Red Sussex	..	1	"
			—	
	<b>Total</b>	..	33	"

In addition to the above, there were eleven non-competing pens of pullets, four pens of second year hens, and seven third year hens. Particulars of these will be found on pages 94 *et seq.*

There was a notable improvement in the quality of the pullets sent, especially in the Wyandotte section, and, as was expected, most of the prizes go to this breed. With the exceptions of pen 16 in which the pullets were very backward, and pen 20 in which they were too forward, little fault could be found with the choice made by the owners of pens of this breed.

The highest score ever made by a pullet of any breed in the Irish tests, and, so far as is known, in any eleven months' test, has been made by the White Wyandotte pullet No. 129.

This bird laid 271 eggs in forty-seven weeks beginning 9th October, 1914, and was still laying well at the close of the competition.

**A Record.**

Most of the Rhode Island Red pens were rather backward on arrival.

Some, although entered as March hatched, showed Rhode Island Reds. no sign of springing combs, others were admittedly too late, and this applies to competing as well as non-competing pens. In the latter section pen No. 42 was entered to show that even with fecund strains, late hatching is fatal to success in a test of this kind. Notwithstanding these facts, however, some of the Rhode Island Reds did well, and the only two pullets of one mating (Nos. 241 and 242) made a record for the breed with scores of 246 and 234 eggs respectively in eleven months. These eggs were all first grade, and the fine size and rich colour of the eggs from almost all the Rhode Island Red pens was in striking contrast to the eggs from some of the other breeds.

No real comparison between breeds or strains can, however, be made until the owners send in their birds in as good a condition as the Wyandottes entered. A test unless Pullets general purpose pullet that shows no sign of reddening up at the end of September may be looked upon as useless for early winter laying.

Only two of the four Buff Orpington pens belonged to the utility type. Pens 11 and 12 were exhibition birds, and Buff Orpingtons. the pullets in pen 11 were too young, their first eggs not being laid until 10th December. One pullet in pen 12 never laid. Pen 13 (Buff Orpingtons) won the winter prize; these pullets were of ideal type for utility purposes. Medium in size, fine in bone, alert in movement, and not too much given to broodiness, they were marked out from the beginning as likely to do well. The birds in pen 14 were of laying type, but lacking in vigour.

Minorcas failed to come up to the standard of the previous year.

Pen 1 was unfortunate in having pullet No. 6 included; this bird died without having laid, and the replace bird was too thin on arrival, never laid well, and dropped into an early moult. The eggs from this pen were of excellent size and pure white in colour.

Pen 2 consisted of pullets of good exhibition type, they laid tinted eggs and some of them went broody. These pullets were bred from heavy layers mated with cockerels from an exhibition yard, and showed the mistake of choosing male birds from such a source for mating with hens of a laying strain.

White Leghorns, although few in number, were of good quality. The birds in pen 4 were late hatched and backward on arrival, notwithstanding which one pullet (No. 23) made a record for the Leghorn breed in Ireland by laying 244 eggs in forty-five weeks. Owing to



the fact that so many of her eggs were second grade this pullet failed to carry off the special prize for the best non-sitter. The record of this pen was spoiled by the inclusion of pullet No. 20. The birds in pen 5 laid very large eggs, and owe their position in the prize list to this fact. They were bred from Australian cockerels.

Brown Leghorns were not as good as those of previous years, but some of the pullets were too late hatched to have any chance of doing well.

Reference to Table 'A' shows considerable variation in dates of hatching for winter laying. A few pens were too early as for instance pen 20 among the competing, and pen 43 among the non-competing pens, the records of which were completely spoiled owing to most of the pullets having moulted.

It is not possible to lay down a hard and fast rule as to the best dates of hatching for October or early winter egg production, as so many other factors affect the development of the pullets. Some strains and breeds mature more quickly than others, and individual hens of the same strain differ greatly in the rapidity or otherwise of the development of their daughters. One of the most valuable stock hens (No. 70) at the Munster Institute, now in her fourth year, and the mother of all the heaviest layers on the farm, has never bred an early developing daughter, that is, one ready to lay before six months old. On the other hand, an equally valuable old stock bird (No. 17), now in her fifth year, bred pullets that, if fed, would, and sometimes did, lay at four-and-a-half months old.

The feeding of the chicken from shell to maturity is one of the most important factors in its development. A

**Feeding.** poorly fed chicken never makes a good or an early layer.

Other conditions that retard or hasten the development of the birds are housing, run and climate. Chickens in good airy houses and on free range have the best of all conditions for growth. In very exposed places maturity is longer delayed and earlier hatching will be more necessary than in warm sheltered spots.

The wisest course for the owner of stock of average quality in Ireland is to avoid having general purpose breeds hatched out before the end of February or after the middle of March, while for the non-sitting breeds, a month later, that is from the last week in March to the middle of April, will give good results. The latter

**The safe Rule.**

dates refer to the small laying type of non-sitters. Heavy Leghorns and Minorcas of the exhibition type should be hatched before the end of March. It is not to be assumed that winter eggs cannot be obtained from pullets hatched later than this, but in a competition, the pens that start to lay in October have a considerable advantage over those that do not. It is much easier to make a record from the 1st November to 1st November, than when the laying year begins on 1st October.

Once again serious attention has to be drawn to the number of small eggs laid, especially by the White Wyandottes. This, no doubt, is in a great measure due to the use of male birds, the progeny of heavy layers of small eggs. As an instance of the introduction of undesirable traits through the male parent, pen 2 (Black Minorca) has already been cited, but there is an equally striking instance in the case of pen 18 (White Wyandottes). These pullets were bred from the original pen 31, winners of the 1912-13 competition, birds remarkable for their almost total freedom from broodiness (there were only five broody periods during the eleven months) and for the good size of their eggs. Four of their daughters in pen 18 never laid a first grade egg and there were thirty-two broody periods. The pullets in the non-competing pen No. 44 were sisters to those in pen 18, having been hatched from eggs purchased from the present owner of pen 31. Some of the pullets in pen 44 laid good eggs but few in number, two never laid a first grade egg, and, except one bird (262), all were inclined to broodiness. Clearly the small egg and the undue tendency to broodiness must have come through the male parent.

When purchasing a male bird the buyer should be certain that the hen from which the bird is bred is a good winter layer, that her eggs are of good size, and, if possible, of good colour, and that the hen is not much given to broodiness. Only a breeder who keeps careful trap-nest records, at least during the four winter months, can give these particulars. The value of birds of this description cannot be too widely known. Beginners are often misled by advertisements of number of eggs laid while no information is given as to size. On reading the advertisements in papers devoted to the interests of live stock, it might be thought that 250 to 280 egg strains are quite common. As a matter of fact no such strain exists. Many breeders have individual birds with records of from 250 to 280 eggs in a year and a very few perhaps higher, but the occurrence of even a dozen such birds among a flock of some hundreds of pullets does not constitute a 250 or a 280 egg strain, even though every bird in the yard be descended from a 280 egg hen. The cockerels bred

from these high record hens are, however, most valuable for improving the laying of the progeny of ordinary flocks. A cockerel bred from a bad laying hen can never breed good layers.

While the value of cockerels of reliable parentage is just beginning to be realised, there is the danger that buyers will be disappointed if every cockerel of such parentage does not breed 200 egg layers. Every son of a 200 egg hen is not of equal value in the breeding pen, because all 200 egg hens are not pure for the factor that gives high production.

Nothing in the external appearance of a cockerel gives any clue to his value as a breeder of heavy layers. The No guide in outward appearance. only way to find this out is in the breeding pen, the winter records of his daughters being the test.

Thus it happens that a breeder may sell the most valuable bird and keep a worthless one, as for instance the cockerel that sired the pullets in pen 42. This cockerel although the son of a heavy layer and mated with none but 200 egg hens, never bred a good layer, and is consequently of no value. On the other

hand a bird that is found to breed good laying pullets should be kept as long as he is fit for the breeding pen. The practice of selling male birds at the end of the season and before anything is known of the laying powers of their daughters is most unwise. It is also a mistake for the owner of a valuable laying strain not to test a few cockerels each year, so as to have always a reserve of high grade birds.

To test the value of the pullets from these different matings it is necessary to trap-nest only during the autumn and early winter months, say from 1st October to 31st January. There is no necessity to do so for a longer period as the pullets that give good records (say 40 eggs and upwards) during these four months are the only ones worth considering as breeders.

At the beginning of the competition just closed it seemed doubtful to many people if the production of table eggs could pay in view of the enhanced food prices. This was in many instances the excuse made by poultry-keepers who either failed to rear any pullets or reared a reduced number during the past spring.

The figures in the following Tables show that, notwithstanding the increased cost of production, the returns are much better, and this would have been the case even if the average egg yield had not shown any improvement on that of previous years :

TABLE SHOWING COST OF FOOD.

			£	s.	d.
1st period,	1st Oct.-31st Dec. (13 weeks)	..	25	11	11
2nd	„ 1st Jan.-31st Mar. ( „ )	..	30	17	1
3rd	„ 1st Apl.-30th June ( „ )	..	27	10	1
4th	„ 1st July-31st Aug. (9 weeks)	..	20	11	9
			<hr/> £104 10 10		

The total cost of food for pullets and second and third year hens for the 11 months, and for six male birds used in the non-competing pens from January to July, amounts to £104 10s. 10d., or an average of 7s. 0½d. per head as against 5s. 8¾d. for the previous competition. The total of 7s. 0½d. includes 2d. per head for grit and shell.

TABLE SHOWING RETURNS FROM PULLETS ONLY.

No. of Pullets Penned.	No. of Eggs laid.	Money Received for Eggs.	Profit over Cost of Food.	Gross Return per Pullet.	Net Return.	Average Price of Eggs.
	Doz.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
264	3,313½	230 15 7	137 16 7	0 17 6	0 10 5½	0 1 4½

The following Table gives the amount of each food used, together with total cost of same. The foods were purchased locally in the open market and in small quantities, except in the case of fish meal and clover meal which were bought in ton lots. The price of these includes the cost of freight. The price of foods bought locally includes the cost of cartage from Cork City :—

Food.	Quantity.	Total Cost.
	Cwts.	£ s. d.
Maize Meal .. .. .	24½	10 16 9
Cracked Maize .. .. .	61	28 5 9
Pollard .. .. .	26	9 9 6
Bran .. .. .	20	7 7 0
Malt Culms .. .. .	5½	1 3 6
Barley Meal .. .. .	1½	0 15 0
Linseed Meal .. .. .	1	0 11 3
Rice Meal .. .. .	7½	2 8 6
Dried Grains .. .. .	1	0 6 10
Clover Meal .. .. .	8½	3 10 0
Fish Meal .. .. .	13½	9 19 0
Oats .. .. .	58½	26 0 10
Turnips .. .. .	20	1 5 0
Grit and Shell .. .. .	10½	1 17 10
Milk .. .. .	169 gallons	0 14 1
Total ..		£104 10 10

The feeding was done on the same lines as in previous years.\*

**Changes in Food** It will be noticed, however, that there is a considerable increase in the amount of maize and maize meal used ; this was due to the prohibitive price of good oats during a great part of the test, and is to some extent counterbalanced by the increased amount of clover meal. The exceptionally wet winter (there were twenty-nine days of rain and 10 inches of rainfall in December) and the cold wet spring favoured the free use of maize. The practice of using nothing but the plainest foods and avoiding spices of every kind has again been followed, and a study of the Tables shows that good layers can lay as well on these foods as on the most expensive laying mixtures.

**Prices.**

With the exception of pen 35, which lost four birds, and pens 5, 14 and 23, which lost two birds each, the health of the birds may be considered satisfactory. Two pullets, viz. : Nos. 6 and 81, died without having laid.

There were no cases of colds ; some cases of scaly leg and three cases of crop binding were successfully treated.

Prizes were offered for the eight pens producing eggs of highest market value.

**Prizes.** A first class certificate was offered for pens laying an average of 200 eggs, and a second class certificate for pens laying 160 eggs or over.

Prizes have been awarded to pens owned by the following :—

1st Prize, £5, and Second Class Certificate :—

Miss McCormack, Brookend House, Stewartstown, Co. Tyrone (Pen 25, White Wyandottes).

2nd Prize, £4, and Second Class Certificate :—

Mrs. Strong, Moate House, Kells (Pen 22, White Wyandottes).

3rd Prize, £3, and Second Class Certificate :—

Miss Moore, Roughgrange, Donore, Drogheda (Pen 21, White Wyandottes).

4th Prize, £2, and Second Class Certificate :—

Mrs. Strong, Moate House, Kells (Pen 23, White Wyandottes).

5th Prize, £1 10s., and Second Class Certificate :—

Mrs. Strong, Moate House, Kells (Pen 18, Buff Orpingtons).

\* See Reports of previous Competitions.

6th Prize, £1 5s., and Second Class Certificate :—

Mrs. Turkington, The Villa, Derrytrasna, Lurgan (Pen 15, White Wyandottes).

7th Prize, 15s., and Second Class Certificate :—

Mrs. Higgins, Carrmarla Lodge, Claremorris, Co. Mayo (Pen 5, White Leghorns).

8th Prize, 10s., and Second Class Certificate :—

Miss Hennerty, Thornhill Cottage, Ballinalough, Cork (Pen 16, White Wyandottes).

Special Prize, £1, for best winter return :—

Mrs. Strong, Moate House, Kells (Pen 13, Buff Orpingtons).

Special Prize, £1, for best non-sitting pullet :—

Mrs. Higgins, Carrmarla Lodge, Claremorris, Co. Mayo (Pen 5, No. 26, White Leghorn).

Special Prize, £1, for best sitting pullet :—

Mrs. Strong, Moate House, Kells (Pen 22, No. 129, White Wyandotte).

Second Class Certificates have been awarded to the following :—

Mr. D. K. O'Sullivan, 89 Emmet Road, Dublin (Pen 4, White Leghorns).

Mrs. Harris, Adamstown, Knocklong (Pen 19, White Wyandottes).

Mrs. Rankin, Newtowncunningham, Londonderry (Pen 20, White Wyandottes).

Mr. T. J. Maguire, 31 Claremont Road, Dublin (Pen 31, Rhode Island Reds).

Merit	No. of Pen.	Breed and Owner.	Time of Hatching.	No. of Pullet.	Weight.		Eggs			
					On Arrival lb. oz.	At close of Test. lb. oz.	Oct.	Nov.	Dec.	Jan.
1	25	White Wyandotte. (Miss McCormack, Brookend House, Ardbor, Stewartstown, Co. Tyrone).	8th March.	145	4 8	5 4	13	24	21	2
				146	4 4	5 0	19	24	23	2
				147	4 0	4 8	—	—	11	2
				148	4 8	5 4	—	14	20	2
				149	3 8	4 8	—	18	23	
				150	3 12	4 8	—	8	23	
2	22	White Wyandotte. (Mrs. Strong, Moate House, Kells, Co. Meath.)	February.	127	3 8	5 0	—	—	17	
				128	3 12	6 8	—	13	23	
				129†	3 12	5 0	22	30	29	
				130	3 0	4 8	—	10	25	27
				131	4 4	5 8	—	12	24	23
				132	3 4	4 0	—	1	23	21
3	21	White Wyandotte. (Miss K. Moore, Roughgrange, Donore, Drogheda.)	12th March.	121	3 8	4 0	18	20	12	9
				122	4 0	5 0	—	13	21	25
				123	4 4	5 12	—	—	11	19
				124	3 12	4 8	10	25	17	24
				125	4 4	4 8	23	23	24	27
				126	3 8	5 0	—	—	21	24
4	23	White Wyandotte. (Mrs. Strong, Moate House, Kells.)	March.	133†	3 8	—	18	20	22	18
				134	4 12	6 0	7	20	22	14
				135§	3 4	—	—	21	26	25
				136	4 12	5 12	—	2	17	23
				137	4 0	4 12	—	—	13	20
				138	3 12	5 0	—	11	23	24
5	13	Buff Orpington. (Mrs. Strong, Moate House, Kells.)	February.	73	4 4	5 0	24	22	11	11
				74	3 12	5 0	—	11	24	23
				75	3 8	5 0	15	22	19	16
				76	4 0	4 8	2	5	25	25
				77†	4 8	5 0	18	—	10	16
				78	4 4	4 8	19	21	23	22
6	15	White Wyandotte (Mrs. Turkington, The Villa, Derrytrasna, Lurgan.)	25th March.	85	4 0	5 4	—	—	11	24
				86	5 4	5 8	12	4	13	5
				87	4 4	4 12	25	15	19	21
				88	4 0	5 8	—	5	26	24
				89	4 12	5 8	8	20	20	19
				90	4 8	5 0	—	12	23	21
7	5	White Leghorn. (Mrs. Higgins, Carrowmarley Lodge, Claremorris, Co. Mayo.)	[Not stated.]	25	2 4	3 12	—	—	2	19
				26†	3 0	4 0	11	23	18	23
				27†	2 8	—	—	13	24	18
				28	3 0	4 12	—	8	18	16
				29	3 0	4 8	5	23	22	22
				30	2 0	—	—	—	8	20
8	16	White Wyandotte. (Miss Hennerty, Thornhill Cottage, Ballinlough Road, Cork.)	(2) 3rd March. (4) 26th "	91	4 0	4 12	—	—	19	24
				92	3 8	5 0	—	—	18	27
				93	3 4	4 8	—	—	27	28
				94	3 12	6 0	—	—	12	30
				95	3 12	5 8	—	—	4	26
				96	3 4	4 12	—	—	14	27
9	4	White Leghorn. (Mr. D. K. O'Sullivan, 89 Emmett Road, Dublin.)	24th April.	19	3 0	4 0	—	11	20	20
				20†	2 12	—	—	1	15	14
				21	2 12	3 8	6	20	12	8
				22	3 0	3 12	—	14	23	22
				23**	2 12	3 12	9	24	24	24
				24	2 12	3 8	—	—	9	20

\* Still laying at close of Competition.  
Moulted.

† Died and was replaced.

§ Died on 18/8/15—replaced bird laid only one egg.

Laid.								Total per Hen.	Value per Hen. s. d.	Untrapped Eggs.	Total Weight & No. of Eggs from Pen, from 1/10/14 to 31/8/15.	Total Value of Eggs from Pen.	No. of times Brood.
Feb.	Mar.	April.	May.	June.	July.	Aug.							
18	22	23	24	15	17	18	216*	27 2					1
18	25	15	18	14	19	18	215*	27 6 $\frac{1}{2}$			lb. oz.		4
18	20	15	17	14	15	13	143*	16 2 $\frac{1}{2}$	3		152 6		5
15	21	22	9	14	7	17	157	19 10					4
21	26	23	23	25	23	24	229*	27 5 $\frac{1}{2}$				£ s. d.	—
20	22	21	20	21	15	19	191*	23 6			1154	7 2 2	—
22	21	17	13	16	15	13	156*	18 4					6
21	23	19	14	13	9	6	162*	20 7 $\frac{1}{2}$			lb. oz.		—
25	30	27	28	13	17	23	271*	31 11			148 11		2
24	29	28	25	25	26	25	244*	26 3					—
13	23	17	13	18	12	11	166*	20 10 $\frac{1}{2}$				£ s. d.	7
22	23	22	18	18	9	15	172*	20 3			1171	6 18 3	4
10	19	16	12	14	15	11	156*	19 4					5
21	25	25	25	17	20	24	216*	26 6			lb. oz.		2
19	20	21	13	14	17	14	148*	17 6			142 13		5
20	24	17	14	10	11	12	184*	23 9					6
21	27	23	14	14	13	22	231*	26 2				£ s. d.	3
20	23	22	17	19	11	20	177*	21 4			1112	6 14 7	1
19	23	16	6	2	11	12	167	20 1					—
17	22	20	22	22	25	19	210*	26 2			lb. oz.		—
23	26	23	25	10	13	4	196	21 5 $\frac{1}{2}$			134 8		2
23	26	25	15	14	17	18	180*	21 3					4
20	25	26	18	14	16	20	172*	19 3 $\frac{1}{2}$				£ s. d.	3
23	21	15	16	12	10	9	164*	20 6 $\frac{1}{2}$			1089	6 8 9 $\frac{1}{2}$	6
20	27	18	19	18	13	17	200*	24 11 $\frac{1}{2}$					5
4	26	16	20	11	13	12	160	17 11			lb. oz.		7
7	26	18	19	16	6	18	182*	22 5			134 0		4
13	20	23	19	15	15	10	172*	20 5					4
2	21	18	13	11	11	12	132	15 8 $\frac{1}{2}$				£ s. d.	7
19	24	17	16	13	14	15	203	26 4			1049	6 7 9	4
22	24	17	15	17	14	17	161	18 9 $\frac{1}{2}$					5
14	16	19	21	20	8	22	154*	18 0 $\frac{1}{2}$			lb. oz.		1
13	24	16	14	15	13	8	183	23 5			132 14		7
19	24	20	17	13	8	20	176*	21 6					4
10	21	20	23	20	19	21	201*	24 10 $\frac{1}{2}$				£ s. d.	—
17	20	16	16	20	14	13	172*	20 4 $\frac{1}{2}$			1047	6 7 0	4
19	24	20	20	4	22	21	151*	16 9 $\frac{1}{2}$					—
20	24	22	14	16	23	22	216*	27 4			lb. oz.		—
11	17	13	—	—	—	18	114*	14 8 $\frac{1}{2}$			132 10		—
1	20	21	10	16	12	22	144*	17 9					—
22	26	22	19	19	18	19	217*	26 3				£ s. d.	—
21	27	23	23	8	21	25	176*	19 4 $\frac{1}{2}$			1018	6 2 2 $\frac{1}{2}$	—
22	28	28	22	18	13	13	187*	18 11					5
23	25	17	21	16	12	19	178	18 11			lb. oz.		5
21	26	24	17	11	18	3	175	19 9	2		131 8		4
26	24	17	14	18	16	20	177*	18 8					7
24	27	28	30	27	26	26	218*	23 3				£ s. d.	—
23	26	21	14	17	14	15	171	17 8			1108	5 17 6	5
16	22	23	20	21	19	19	191*	20 2					—
—	10	18	16	—	9	2	85	9 1 $\frac{1}{2}$			lb. oz.		—
18	24	23	22	18	18	21	190*	20 3 $\frac{1}{2}$			124 0		—
20	27	25	10	11	20	22	194*	22 5 $\frac{1}{2}$					—
20	27	25	23	23	21	24	244*	26 8 $\frac{1}{2}$				£ s. d.	—
20	24	23	12	20	14	—	142	15 7 $\frac{1}{2}$			1046	5 14 4 $\frac{1}{2}$	—

|| Original Pullet did not lay.

\*\* Laid 2 eggs, too small to be recorded.

|| Wins Special Prize, £1.



Order of Merit	No. of Pen.	Breed and Owner.	Time of Hatching.	No. of Pullet.	Weight.		E.		
					On Arrival lb. oz.	At close of Test. lb. oz.	Oct.	Nov.	Dec.
10	19	White Wyandotte. (Mrs. Harris, Adamstown, Knocklong.)	25th Feb. & 17th March.	109	3 12	5 4	—	—	12
				110	4 4	5 0	—	16	24
				111	4 4	4 12	7	5	23
				112	5 0	5 4	—	—	20
				113	4 8	5 4	—	—	20
				114	4 0	5 0	—	—	12
11	1	Black Minorca. (Mrs. Harris, Adamstown, Knocklong.)	17th March.	1	4 4	4 0	11	9	12
				2	4 8	5 0	4	20	11
				3	4 8	4 8	22	21	11
				4	4 4	4 8	9	11	4
				5	3 8	4 4	—	15	15
				6†	3 8	—	—	—	—
12	10	Red Sussex. (Mrs. Gorman, Newtown, Bagenalstown.)	March.	55	4 4	5 12	—	—	20
				56	4 8	5 8	—	5	25
				57	3 12	5 12	—	—	23
				58	4 4	5 8	6	23	25
				59	4 8	5 4	—	—	16
				60	4 0	5 4	—	—	21
13	31	Rhode Island Red. (Mr. T. J. Maguire, 31 Claremont Road, Sandymount, Dublin.)	March.	181	4 8	4 12	—	22	23
				182	5 0	6 0	—	2	16
				183	4 8	5 4	—	20	21
				184	4 8	5 0	—	—	13
				185	4 8	5 0	—	11	24
				186	3 12	5 0	—	—	16
14	24	White Wyandotte (Mrs. J. Fletcher, Ballacolla, Queen's Co.)	March and April.	139	4 12	5 0	16	19	21
				140	3 8	4 8	—	—	—
				141	4 0	5 12	—	—	—
				142	4 0	5 8	—	—	—
				143	5 4	6 0	—	14	22
				144	3 12	4 8	2	17	17
15	20	White Wyandotte. (Mrs. Rankin, Newtown Cunningham, Londonderry.)	March and April.	115	3 8	5 0	—	—	—
				116	3 8	4 4	—	11	21
				117	3 8	4 4	23	23	23
				118	4 0	4 8	—	11	23
				119	4 4	5 12	7	—	—
				120	4 4	5 0	7	19	18
16	27	White Wyandotte. (Miss McDonald, Dunganstown, Kilbride, Co. Wicklow.)	March.	157	3 12	5 0	—	—	19
				158	3 0	4 4	—	—	11
				159	2 12	4 8	—	—	12
				160	3 4	5 4	—	—	9
				161	3 12	5 12	—	17	12
				162	3 4	5 0	6	23	1
17	28	Rhode Island Red. (Mrs. Thompson, Sloblands, Tiermaclane, Ennis.)	1st April.	163	4 0	4 0	—	14	23
				164	4 8	5 8	—	18	15
				165	4 8	6 0	—	—	13
				166	4 12	6 4	—	2	18
				167	5 4	6 12	3	22	21
				168	4 8	5 4	—	—	6
18	18	White Wyandotte. (Mrs. Byrne, Garryduff House, Gowran, Co. Kilkenny.)	March.	103	3 12	4 12	—	—	11
				104	2 12	5 0	—	—	6
				105	3 8	5 8	—	—	—
				106†	4 0	5 0	13	16	21
				107	4 0	6 0	—	13	23
				108	3 4	5 8	—	6	21

\* Still laying at close of Competition.

† Died and was replaced. [Original Pullet No. 6 never laid.]

Laid.								Total per Hen.	Value per Hen. s. d.	Untrapped Eggs.	Total Weight & No. of Eggs from Pen, from 1/10/14 to 31/8/15.	Total Value of Eggs from Pen. £ s. d.	No of Birds
Feb.	Mar.	April.	May.	June.	July.	Aug.							
20	23	14	15	13	11	13	141*	16 10 $\frac{1}{2}$					6
23	25	16	14	11	14	11	178*	20 4			lb. oz.		—
19	24	22	22	18	19	20	202*	21 3			121 11		—
20	26	23	19	6	9	18	165*	16 10 $\frac{1}{2}$					—
21	26	21	23	16	14	23	165*	16 2 $\frac{1}{2}$				£ s. d.	—
20	23	22	22	18	16	11	166*	19 6 $\frac{1}{2}$			1017 $\frac{1}{2}$	5 11 1	—
19	24	25	21	13	11	19	179*	21 6					—
23	22	21	20	17	18	17	182*	22 2			lb. oz.		—
19	22	21	24	12	20	20	208*	25 11			131 0		—
13	23	21	19	10	19	20	157*	18 4 $\frac{1}{2}$					—
17	20	19	19	9	8	18	147*	17 10				£ s. d.	—
—	11	19	8	11	6	—	55	5 3			923	5 11 0 $\frac{1}{2}$	—
22	21	17	18	14	16	18	162*	18 1 $\frac{1}{2}$					8
20	20	13	13	16	11	18	150*	16 11 $\frac{1}{2}$			lb. oz.		—
20	18	19	18	16	13	12	165*	18 7 $\frac{1}{2}$			116 0		—
21	23	21	14	16	15	15	201*	22 9					—
16	15	16	17	10	4	9	114	13 4				£ s. d.	—
22	23	23	20	15	12	8	167*	18 1 $\frac{1}{2}$			959	5 7 11	—
19	23	20	26	22	20	25	221*	23 9					—
18	22	14	19	11	7	12	121*	12 11			lb. oz.		—
15	14	16	17	12	9	12	154*	17 6			115 8		—
20	24	24	25	17	12	13	167*	17 1 $\frac{1}{2}$					—
19	26	18	18	18	11	12	177*	20 0 $\frac{1}{2}$				£ s. d.	—
21	23	10	18	4	8	5	129*	15 3			969	5 6 7	—
21	24	19	15	10	13	14	194*	25 0 $\frac{1}{2}$					5
23	19	22	13	15	—	—	106	11 0			lb. oz.		—
22	20	18	11	15	9	6	124*	14 5	8		117 13		—
20	14	11	10	9	7	8	98	11 7					—
21	13	21	16	10	11	11	161	19 11 $\frac{1}{2}$				£ s. d.	—
10	21	19	20	18	18	18	176*	21 8 $\frac{1}{2}$			867	5 5 2	—
20	24	16	17	10	8	14	119*	11 6					3
20	20	20	19	16	7	—	156	17 0			lb. oz.		—
19	23	13	19	12	10	12	199	22 11	1		112 5		—
19	24	20	21	16	5	15	173	19 7					—
24	28	23	11	17	20	17	148*	14 5				£ s. d.	—
—	16	22	21	21	21	20	177*	19 4			973 $\frac{1}{2}$	5 4 11	—
18	22	23	24	21	17	17	180*	21 2 $\frac{1}{2}$					—
9	22	17	10	13	6	—	105	11 0			lb. oz.		—
8	18	15	20	9	6	13	106	11 3	85		112 11		—
2	23	17	10	14	10	12	97	10 8 $\frac{1}{2}$					—
7	20	22	19	17	17	16	165*	18 7				£ s. d.	—
10	21	20	21	23	10	1	160	18 1			888	5 3 0	—
18	21	23	23	10	13	12	175	21 6					2
17	24	22	22	19	17	17	171*	20 2			lb. oz.		—
17	21	18	20	18	4	6	125*	14 1			111 0		—
21	26	17	15	14	9	—	136	14 7					—
17	19	18	14	2	—	—	134	17 7				£ s. d.	—
19	22	13	13	10	13	—	115	13 7 $\frac{1}{2}$			856	5 1 6 $\frac{1}{2}$	—
17	22	22	20	17	18	16	163*	16 1 $\frac{1}{2}$					2
18	23	13	16	10	15	12	134	13 11			lb. oz.		—
22	20	17	16	13	15	22	139*	13 2	2		106 8		—
15	15	—	2	22	12	14	147	19 0 $\frac{1}{2}$					—
18	25	17	20	15	9	15	178*	22 2 $\frac{1}{2}$				£ s. d.	—
20	16	13	19	12	10	10	134	15 4 $\frac{1}{2}$			897	5 0 2	—

In addition to this number, there were 14 eggs laid which weighed less than 1 $\frac{1}{2}$  ozs. each.

In addition to this number, there were 7 eggs laid which weighed less than 1 $\frac{1}{2}$  ozs. each.

Order or No. of Pen.	Breed and Owner.	Time of Hatching.	No. of Pullet.	Weight.		Eggs								Laid.								Total per Hen.	Value per Hen.	Unhatched Eggs.	Total Weight & No. of Eggs from Pen, from 1/10/14 to 31/8/15.	Total Value of Eggs from Pen.	No. of Bro.												
				On Arrival lb. oz.	At close of Test lb. oz.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	s. d.																						
19	34 Rhode Island Red. (Mrs. Leahy, Gullinagh House, Newcastle West.)	1st April.	199	4 0	5 8	—	—	—	—	—	—	—	—	—	—	—	—	4	22	20	16	3	9	16	90*	9 1 1/2	—	—	—	—	—	—	—	—	—	—			
			200	4 4	6 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	21	20	20	16	15	12	143	16 10 1/2	—	—	—	—	—	—	—	—	—			
			201	3 8	4 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23	23	26	22	15	17	20	20*	23 2 1/2	—	—	—	—	—	—	—	—	—		
			202	4 8	5 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	12	7	12	7	—	6	111	15 2 1/2	—	—	—	—	—	—	—	—	—		
			203	4 8	5 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	16	18	13	13	14	12	13	136*	15 11 1/2	—	—	—	—	—	—	—	—	—		
			204	4 0	5 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	22	21	19	17	17	106*	11 1 1/2	—	—	—	—	—	—	—	—	—			
	11 Buff Orpington. (Mrs. Coulson, Belmont, Clons.)	20th April.	61	4 12	7 0	—	—	—	—	—	—	—	—	—	—	—	—	—	8	20	15	13	10	10	10	119*	13 10 1/2	—	—	—	—	—	—	—	—	—			
			62	4 4	5 12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	21	22	22	15	10	14	17	151*	17 8 1/2	—	—	—	—	—	—	—	—	—		
			63	4 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	21	21	12	10	6	2	101	11 7 1/2	—	—	—	—	—	—	—	—	—		
			64	4 8	6 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23	21	17	12	10	10	11	158*	19 10	—	—	—	—	—	—	—	—			
			65	4 8	6 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	17	14	13	13	15	10	9	131*	15 7	—	—	—	—	—	—	—	—		
			66	4 4	5 12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	25	20	19	17	10	14	16	136*	15 9 1/2	—	—	—	—	—	—	—	—	—		
21	33 Rhode Island Red. (Miss B. Fox, Monaskill, Manorhamilton.)	27th March.	193	4 8	5 8	—	—	—	—	—	—	—	—	—	—	—	—	—	4	25	21	13	15	13	13	142	17 1	—	—	—	—	—	—	—	—	—			
			194	4 4	5 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18	22	21	14	12	11	13	155*	18 10	—	—	—	—	—	—	—	—	—		
			195	4 0	5 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	20	17	16	8	10	14	141*	17 6	—	—	—	—	—	—	—	—	—		
			196	4 4	5 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15	26	13	13	13	12	14	139	16 6 1/2	—	—	—	—	—	—	—	—	—		
			197	4 4	5 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13	24	19	20	10	10	10	156	19 2 1/2	—	—	—	—	—	—	—	—	—		
			198	4 8	6 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	11	8	—	—	—	—	92	10 10	—	—	—	—	—	—	—	—	—		
22	6 White Leghorn.	End of Mar.	31	3 8	4 4	—	—	—	—	—	—	—	—	—	—	—	—	—	14	20	21	10	11	3	16	135*	16 6 1/2	—	—	—	—	—	—	—	—	—	—		
			32	3 4	4 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	2	—	—	—	—	2	17	90*	10 0 1/2	—	—	—	—	—	—	—	—	—	
			33	3 4	4 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	8	13	10	17	11	13	128*	15 5	—	—	—	—	—	—	—	—	—	—	
			34	3 8	3 12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	17	11	13	—	—	—	—	163*	19 11 1/2	—	—	—	—	—	—	—	—	—		
			35	3 8	4 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	12	20	18	—	—	—	162*	19 11 1/2	—	—	—	—	—	—	—	—	—		
			36	3 0	4 0	—	—	—	—	—	—	—	—	—	—	—	—	—	10	6	—	—	—	—	—	125*	12 4 1/2	—	—	—	—	—	—	—	—	—			
23	36 Rhode Island Red.	March.	211	3 0	6 0	—	—	—	—	—	—	—	—	—	—	—	—	—	15	19	15	13	15	11	21	156*	18 9 1/2	—	—	—	—	—	—	—	—	—	—		
			212	3 8	6 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13	26	23	17	17	16	18	153*	18 2 1/2	—	—	—	—	—	—	—	—	—	—	
			213	3 8	5 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	17	15	—	—	—	—	—	135*	18 2 1/2	—	—	—	—	—	—	—	—	—	—	
			214	3 4	4 12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15	25	25	13	14	9	13	129*	14 5	—	—	—	—	—	—	—	—	—	—	
			215	4 0	5 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	16	5	—	—	—	—	126*	18 9 1/2	—	—	—	—	—	—	—	—	—	—	
			216	3 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	15	11	—	—	—	—	47	6 10 1/2	—	—	—	—	—	—	—	—	—	—		
24	2 Black Minorca.	End of Mar.	7	4 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	22	22	13	9	14	2	112	12 9 1/2	—	—	—	—	—	—	—	—	—	—		
			8	3 4	5 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	18	16	—	—	—	—	171*	20 3	—	—	—	—	—	—	—	—	—	—	
			9	4 0	5 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	9	—	—	—	—	—	126	14 5 1/2	—	—	—	—	—	—	—	—	—	—	
			10	4 0	5 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	21	17	7	—	—	—	177	22 6 1/2	—	—	—	—	—	—	—	—	—	—	
			11	4 8	5 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	15	—	—	—	—	—	144*	17 3 1/2	—	—	—	—	—	—	—	—	—	—	
			12	4 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	17	—	—	—	—	—	—	49	6 2 1/2	—	—	—	—	—	—	—	—	—	—	
25	32 Rhode Island Red.	March.	187	3 8	5 12	—	—	—	—	—	—	—	—	—	—	—	—	—	15	21	16	5	8	2	8	98*	11 6 1/2	—	—	—	—	—	—	—	—	—	—		
			188	4 8	6 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	22	22	18	—	—	—	133	15 4	—	—	—	—	—	—	—	—	—	—	
			189	3 0	5 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	18	—	—	—	—	—	143*	17 5 1/2	—	—	—	—	—	—	—	—	—	—	
			190	4 0	6 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	23	—	—	—	—	—	131*	15 2	—	—	—	—	—	—	—	—	—	—	
			191	3 12	6 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	20	—	—	—	—	—	136*	16 1	—	—	—	—	—	—	—	—	—	—	
			192	3 8	4 12	—	—	—	—	—	—	—	—	—	—	—	—	—	19	—	—	—	—	—	—	107	11 11 1/2	—	—	—	—	—	—	—	—	—	—		
26	8 Brown Leghorn.	April.	43	2 12	4 8	—	—	—	—	—	—	—	—	—	—	—	—	—	11	17	—	—	—	—	—	164*	17 8	—	—	—	—	—	—	—	—	—	—		
			44	3 8	5 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9	19	—	—	—	—	—	142*	16 8	—	—	—	—	—	—	—	—	—	—	
			45	3 0	4 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	17	—	—	—	—	—	189*	20 5	—	—	—	—	—	—	—	—	—	—	
			46	3 4	4 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	15	—	—	—	—	—	117	13 2	—	—	—	—	—	—	—	—	—	—
			47	3 8	4 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15	—	—	—	—	—	—	113	13 1	—	—	—	—	—	—	—	—	—	—
			48	3 0	4 4	—	—	—	—	—	—	—	—	—	—	—	—	13	10	—	—	—	—	—	—	89	9 3	—	—	—	—	—	—	—	—	—	—		
27	14 Buff Orpington	25th April.	79	3 0	5 0	—	—	—	—	—	—	—	—	—	—	—	—	—	17	23	—	—	—	—	—	162	17 11	—	—	—	—	—	—	—	—	—	—		
			80	3 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	15	—	—	—	—	—	133	13 10 1/2	—	—	—	—	—	—					

\* Still laying at close of Competition.

Order of Merit.	No. of Pen.	Breed and Owner.	Time of Hatching.	No. of Pullet.	Weight.		Eggs			
					On Arrival lb. oz.	At close of Test. lb. oz.	Oct.	Nov.	Dec.	Jan.
28	30	Rhode Island Red.	First week in March.	175	3 8	4 8	—	—	8	21
				176§	4 0	5 12	—	—	1	—
				177§	3 8	5 8	—	—	—	1
				178	4 0	5 8	—	—	12	17
				179	3 4	5 0	—	—	—	2
				180	3 4	5 8	—	—	9	18
29	29	Rhode Island Red.	(5) 20th Mar. (1) 1st April.	169	3 12	6 0	—	—	6	21
				170	3 8	5 8	—	—	—	7
				171	3 12	5 0	—	4	21	20
				172	3 8	5 4	—	—	4	23
				173	3 8	5 12	—	—	—	13
				174	3 8	4 12	—	10	20	9
30	9	Brown Leghorn.	10th May.	49	2 12	3 12	—	—	9	14
				50	3 8	4 4	—	—	6	4
				51	3 4	5 12	—	—	5	—
				52	3 4	4 12	—	—	17	4
				53	3 0	4 0	—	—	2	8
				54	3 0	4 4	—	—	—	14
31	12	Buff Orpington.	March.	67	4 4	5 8	—	—	5	27
				68	4 8	6 0	—	—	15	25
				69	4 4	8 4	—	—	—	—
				70	4 0	6 4	—	—	3	23
				71	4 8	6 8	—	—	15	22
				72	4 0	6 8	—	—	8	21
32	17	White Wyandotte.	March.	97	5 4	6 8	—	—	9	11
				98	3 4	4 8	—	—	15	13
				99	4 4	6 0	—	—	1	13
				100	4 8	5 8	—	—	12	13
				101	4 4	5 0	—	—	1	17
				102	5 0	5 0	—	7	20	18
33	35	Rhode Island Red.	First week in April.	205†	2 8	—	—	—	1	24.
				206	3 0	3 12	—	17	24	25.
				207	3 4	6 8	—	—	8	21
				208†	2 12	—	—	4	16	16
				209†	2 12	—	—	14	22	23
				210†	2 8	—	—	—	1	—

TABLE B.

26	White Wyandotte. (Ulster Dairy School, Cookstown.)	March.	151	4 12	5 0	1	22	24	23
			152	4 8	5 0	8	5	20	18
			153	5 4	5 0	10	24	24	20
			154	5 0	5 0	19	17	20	14
			155	5 0	5 0	—	13	22	11
			156	4 8	5 0	8	22	22	21
39	Rhode Island Red. (Munster Institute, Cork.)	February.	229	5 0	4 12	13	17	17	10
			230	4 4	5 0	16	20	23	22
			231	4 4	4 12	1	21	19	16
			232	4 0	4 12	9	22	20	22
			233	4 0	4 8	—	—	20	28
			234	4 4	5 4	—	—	10	22
41	Rhode Island Red. (Munster Institute.)	February (2), March (2), April (2).	241†	5 0	5 4	17	22	22	22
			242†	4 8	5 8	19	23	22	21
			243	4 4	4 12	6	8	17	13
			244	4 12	5 8	—	—	13	21
			245	4 4	5 4	—	—	—	—
			246	4 0	5 0	—	—	—	—

Laid,								Total per Hen.	Value per Hen. <i>s. d.</i>	Untrapped Eggs.	Total Weight & No. of Eggs from 1/10/14 to 31/8/15.	Total Value of Eggs from Pen.	No of tim Broo
Feb.	Mar.	April.	May.	June.	July.	Aug.							
9	11	14	20	14	12	8	117*	13 9			lb. oz.		3
1	2	1	2	6	3	16	32*	3 8½			104 11		4
1	2	4	14	14	17	10	63	6 11					6
14	3	13	14	15	8	14	110*	13 6½	201				6
15	21	20	19	17	—	10	104*	11 0				£ s. d.	—
18	24	17	17	11	11	15	140*	15 1			767	4 8 6½	6
19	18	16	18	12	1	13	124	13 1					4
19	20	4	15	10	10	9	94	10 8			lb. oz.		5
20	22	17	16	16	15	14	165*	19 2½			101 0		5
19	24	23	15	12	11	15	146*	16 6½					4
18	20	15	23	21	16	11	137*	13 1½				£ s. d.	—
—	17	17	19	17	18	20	147*	15 6			813	4 8 1½	4
17	22	20	16	16	2	12	128	13 2½					1
4	20	20	11	19	8	10	102	10 4			lb. oz.		3
17	24	22	19	19	9	—	123	13 4	3		96 6		—
19	20	25	24	19	22	19	183*	19 6½					—
12	22	20	17	13	9	19	128	14 3				£ s. d.	1
16	14	20	20	16	1	—	101	10 2			768	4 1 4	1
16	27	15	17	17	6	13	143	16 9½					7
22	23	18	17	9	10	12	151*	18 3½			lb. oz.		2
—	—	—	—	—	—	—	—	—			96 2		—
22	24	22	18	14	2	—	128	14 8					3
4	15	17	19	12	8	11	123*	14 9½				£ s. d.	6
19	27	17	15	11	10	12	140*	16 5½			685	4 1 0	6
13	21	24	19	22	20	18	157*	16 9½					1
14	23	12	17	12	8	9	123*	14 1			lb. oz.		4
1	—	15	3	8	6	—	47	5 5			93 2		3
10	8	18	8	5	1	—	75	8 4					—
18	21	23	22	20	19	13	154	17 3½				£ s. d.	—
18	17	21	12	—	9	19	141*	17 7			697	3 19 6	—
12	—	—	—	—	—	—	37	4 8½					—
21	28	—	5	17	13	16	166	19 8			lb. oz.		2
17	22	22	24	20	22	20	176*	20 4½			68 7		—
3	—	—	—	—	—	—	39	6 3					—
19	23	23	6	—	—	—	130	16 2				£ s. d.	—
—	—	—	—	—	—	—	1	0 2			549	3 7 4	—

## Non-competing Pens—Pullets.

22	22	21	18	15	14	12	194	24 10					5
14	20	21	19	11	18	10	164*	19 8½			lb. oz.		2
22	20	20	17	12	10	13	192	24 10½			149 14		6
15	18	17	15	18	17	17	187*	24 0½					1
11	22	22	24	17	13	9	164*	20 0½				£ s. d.	—
21	22	19	16	8	17	13	189*	23 11½			1010	6 17 5½	1
4	24	22	20	10	10	18	165*	20 1½					4
18	22	24	27	12	10	14	208*	26 0½			lb. oz.		3
18	22	16	20	14	14	12	173*	20 6½			135 7		3
9	18	15	15	9	—	15	154*	18 2½					7
22	25	24	23	18	16	21	197*	22 10½				£ s. d.	—
16	22	23	26	17	15	19	170*	18 8½			1067	6 6 6	1
21	26	25	25	23	23	20	246*	30 7					—
19	23	25	25	22	20	15	234*	29 7			lb. oz.		—
15	18	17	17	16	13	4	144	15 5			123 6		—
18	25	24	25	24	20	8	178	20 9					—
1	22	22	13	14	10	12	94	9 5½				£ s. d.	4
10	17	16	13	11	12	12	91	8 11½			987	5 14 9	6

\* Untrapped eggs in this pen were laid by Nov. 1922 and 1923

No. of Pen.	Breed and Owner.	Time of Hatching.	No. of Pullet.	Weight.		Eggs			
				On Arrival lb. oz.	At close of Test. lb. oz.	Oct.	Nov.	Dec.	Jan.
43	Rhode Island Red. (Munster Institute.)	Early February.	2	4 12	5 0	24	23	24	23
			5†	4 12	5 0	—	—	4	26
			13†	3 12	4 4	—	—	8	19
			14†	4 12	5 8	21	20	19	18
			17‡	4 4	4 4	20	16	4	—
44	White Wyandotte. (Munster Institute.)	Middle of March.	19†	5 0	5 8	—	—	14	—
			259	5 0	6 0	—	—	6	—
			260	4 0	4 8	—	—	11	—
			261	4 8	5 12	—	—	5	20
			262	4 0	5 8	—	18	22	23
38	Rhode Island Red. (Ulster Dairy School, Cookstown.)	March.	263	4 8	4 12	23	9	24	2 13
			264	4 8	5 0	—	—	16	23 9
			223	4 0	4 0	12	13	17	17 14
			224	4 4	4 12	—	8	21	23 4
			225	4 8	5 4	—	16	20	19 0
40	Rhode Island Red. (Munster Institute.)	March and April.	226	3 12	5 0	—	5	18	17 4
			227	4 0	4 12	—	—	21	25 8
			228	4 4	5 0	—	—	4	13 14
			235**	4 0	5 8	—	—	1	11 7
			236	4 8	4 12	—	14	23	25 5
37	Rhode Island Red. (Albert Agricultural College.)	February.	237	3 12	5 4	—	15	12	9
			238	4 0	5 0	—	12	21	6
			239	4 0	5 0	—	—	23	24
			240	3 4	4 8	—	—	—	11
			217	4 8	5 8	15	18	18	17
42	Rhode Island Red. (Munster Institute.)	14th April.	218	4 12	5 0	—	—	9	20
			219†	5 0	5 8	3	—	2	—
			220	5 0	6 0	4	1	—	3
			221‡	4 0	5 0	—	—	—	8
			222†	4 0	5 0	8	3	—	—
3	Black Minorca. (Albert Agricultural College.)	April.	247	3 8	5 8	—	—	4	19
			248	3 12	5 12	—	—	—	14
			249	3 8	5 8	—	—	8	21
			250	3 8	4 8	—	—	10	19
			251†	3 0	3 12	—	—	5	24
7	White Leghorn. (Albert Agricultural College.)	April.	252	3 8	5 4	—	—	—	7
			13	3 8	5 0	—	—	2	11
			14	3 12	5 4	—	—	—	12
			15	4 0	4 8	3	20	20	18
			16	3 12	4 12	—	—	19	19
3	Black Minorca. (Albert Agricultural College.)	April.	17	3 4	4 8	—	—	8	11
			18	4 0	5 4	—	—	17	3
			37	3 4	4 4	—	—	10	22
			38	3 8	4 12	—	—	1	20
			39	3 12	4 8	—	—	—	10
7	White Leghorn. (Albert Agricultural College.)	April.	40	3 8	4 4	—	—	3	4
			41	4 0	5 4	—	2	19	19
			42	3 8	4 8	—	—	7	19

\* Still laying at close of Competition.

† Moulded Oct. and Nov.

‡ Moulded in February.

‡ Moulded in Dec. and Jan.

¶ See page 83.

Laid.							Total per Hen.	Value per Hen. s. d.	Untrapped Eggs.	Total Weight & No. of Eggs from Pen, from 1/10/14 to 31/8/15.	Total Value of Eggs from Pen. £ s. d.	No. of time Brood
Feb.	Mar.	April	May.	June.	July.	Aug.						
22	23	26	23	16	16	8	228*	29 0				2
21	16	17	18	14	13	13	142*	15 9½		lb. oz.		5
6	14	16	16	15	12	14	120*	11 9		121 14		8
3	16	24	23	20	11	18	193*	22 4				1
11	24	22	15	18	12	13	155*	16 6			£ s. d.	4
10	18	26	28	14	20	17	162*	17 4½		1000	5 12 9	2
15	21	17	18	14	8	16	136*	15 4½				5
19	20	20	10	11	13	15	140*	16 8½		lb. oz.		6
15	16	23	11	17	18	2	126	13 10	1	117 12		3
15	17	18	20	14	14	13	170*	21 0½				—
21	25	17	15	13	12	18	200*	23 4½			£ s. d.	6
21	28	25	19	14	14	14	174*	17 8½		947	5 8 2½	4
14	22	20	14	17	10	15	171	18 9½				4
14	25	21	23	11	—	16	162	17 11		lb. oz.		2
15	20	20	18	11	10	16	165*	20 7	5	118 5		—
8	16	23	25	12	12	13	149*	15 10				3
21	25	24	25	14	20	21	196*	21 6½			£ s. d.	—
15	21	21	14	12	12	12	124	12 6½		972	5 8 0	5
7	24	22	17	16	9	16	123*	13 2				4
20	22	23	17	21	7	17	189*	22 10		lb. oz.		3
21	23	18	16	15	14	14	157*	18 2½		119 8		5
14	18	13	14	10	16	15	139*	16 6				8
21	24	22	20	20	14	6	174*	21 1			£ s. d.	1
22	25	24	21	22	1	19	145*	15 8½		927	5 7 6	—
19	25	11	16	15	13	10	177*	21 8½				5
16	20	16	13	16	10	10	130	13 5	137	lb. oz.		7
2	17	15	13	12	14	13	91*	9 5½		110 1		6
4	10	20	21	19	15	10	107*	11 5				1
16	20	19	22	13	—	18	116*	12 6½			£ s. d.	—
11	23	14	19	15	11	10	114	11 11½		872	5 1 0½	6
16	20	22	13	14	14	13	135*	15 0½				4
12	23	14	19	13	11	10	116*	11 7	15	lb. oz.		5
18	17	16	12	11	10	12	125*	14 10		102 8		6
19	22	20	19	18	17	18	162*	18 4			£ s. d.	—
19	23	22	23	1	19	1	137	15 5				—
22	22	22	11	9	13	12	118*	11 9½		808	4 9 7	3
5	18	20	18	18	3	4	99*	10 9½				—
16	17	17	17	5	9	4	97*	10 8		lb. oz.		1
16	20	19	13	9	12	13	163*	20 10½		97 6		2
18	18	19	16	17	5	18	149*	18 1			£ s. d.	—
6	12	17	10	15	—	8	87	10 1				—
13	21	18	14	16	1	4	107*	12 6		702	4 3 0	—
20	21	20	4	14	3	16	130*	15 7				—
14	21	22	10	8	20	19	135*	15 1½		lb. oz.		—
20	22	20	16	10	—	—	98	10 5½		90 8		—
7	5	5	5	3	—	—	32	3 5½				—
15	18	25	21	11	7	21	158*	18 6			£ s. d.	—
18	19	19	16	6	16	13	133*	15 5		686	3 18 6½	—

\*\* Operated on for crop-binding, 18th Jan.

†† Badly torn at the end of May.

†† Most of the untrapped eggs were laid by Nos. 219 and 222.

TABLE C.—SHOWING RETURN FROM SECOND YEAR AS COMPARED WITH FIRST-YEAR HENS.

No. of Pen.	No. of Hens in Pen.	Eggs Laid.		Value.		Total Value 1st Oct., 1913, to 31st Aug., 1915.*
		1913-14 1st Oct. to 31st Aug.	1914-15 1st Oct. to 31st Aug.	1913-14 1st Oct. to 31st Aug.	1914-15 1st Oct. to 31st Aug.	
45	6†	1143	666	£ s. d. 5 12 6½	£ s. d. 3 18 10	£ s. d. 10 2 7½
47	6‡	1092	746	5 5 10½	4 2 4½	9 19 3
50	6	1018	746	4 19 6	4 2 9½	9 13 2
46§	6	572	438	2 8 11½	2 7 8	5 2 7½

\* Includes value of eggs laid in September, 1914. The figures for this month do not appear in Competition Reports which cover eleven months only.

† One hen died, 7th April, 1915.

‡ Two hens died, one on the 14th June, 1915, and one on the 20th July, 1915.

§ This was Pen 20, the lowest pen in the 1913-14 Competition, and was purchased from the owner for the purpose of a breeding test.

|| One hen died, 16th November, 1914.

TABLE D.—SHOWING FIRST, SECOND AND THIRD YEARS' RETURNS FROM HENS THAT PROVED GOOD LAYERS IN THEIR FIRST YEAR.

Ring No.	Eggs Laid.			Value.		
	1912-13 1st Oct. to 31st Aug.	1913-14 1st Oct. to 31st Aug.	1914-15 1st Oct. to 31st Aug.	1912-13 1st Oct. to 31st Aug.	1913-14 1st Oct. to 31st Aug.	1914-15 1st Oct. to 31st Aug.
45	178	157	130	£ s. d. 0 16 7½	£ s. d. 0 13 11	£ s. d. 0 14 7
46	197	138	70	0 18 5½	0 13 2½	0 7 7
48	200	145	88	0 17 4½	0 13 5½	0 9 9
51	209	169	118	0 19 3½	0 15 11	0 13 6½
54	179	143	125	0 17 0½	0 15 0½	0 14 2½
55*	110	155	67	0 9 8½	0 11 9½	0 7 3
56	195	180	134	0 17 4	0 16 7½	0 14 11½
Totals	1268	1087	732	5 15 10½	4 19 11½	4 1 10½

\* This hen was badly torn in January 1913.

NOTE.—For purposes of comparison, the figures for September, 1913, and September, 1914, have been omitted.



## THE ESTIMATION OF FAT IN MILK AND CREAM.\*

It is now the practice in all well-managed creameries to base the price paid for milk on the percentage of fat which it contains. Sometimes cream itself is purchased, and this, too, is valued according to its fat content. On the person, therefore, who is entrusted with the estimation of the percentage of fat, whether in milk or in cream, there rests a heavy responsibility. If he is to do justice to all concerned, he cannot too seriously study the instructions herein contained, nor can he bestow too great care on every detail in sampling, testing, and recording.

### THE TESTING ROOM AND ITS EQUIPMENT.

It is assumed that every creamery is provided with a well-lighted room, which is used solely for testing, and in which a strong rigid bench (for the centrifuge) and the following appliances and reagents are conveniently and neatly arranged:—

1. A steam turbine or crank-driven centrifuge for twenty-four bottles, provided with means of keeping the test bottles hot during whirling.

2. An ample supply of test bottles and stands; the former numbered consecutively by means of small brass or aluminium labels twisted round the necks, and the latter by numbered enamelled strips fixed on the top of the rack between the two rows of test bottles. There should be no duplicate numbers, which are a common cause of confusion and error.

3. A large copper water-bath for forty-eight test bottles, with overflow and draw-off tap, supported on an iron stand, and heated by means of a steam pipe under the false bottom, a No. 4 Primus paraffin lamp, or a modern oil stove.

4. Pipettes for measuring out 1 c.c., 10 c.c., and 11 c.c.

5. A 250 c.c. burette for sulphuric acid reading 10 c.c., and a 50 c.c. burette for amyl alcohol reading 1 c.c.

6. A good sink with a hot and cold water supply, overflow and drain pipe.

7. Some No. 8 or No. 10 shot for mixing samples and cleaning out bottles. As this can be used again and again, only a small quantity is necessary.

8. A supply of washing soda, or some good cleansing powder.

9. A bottle of strong ammonia, specific gravity .880, provided with a 2 c.c. pipette and rubber filler.

10. A small bottle of strong hydrochloric acid.

\*This article has been issued as a Bulletin—Bulletin No. 4—and copies can be had free from the Department.

11. A hydrometer and trial jar for sulphuric acid.
12. A hydrometer and trial jar for amyl alcohol.
13. Two large earthenware crocks, one in which to empty the test bottles, and the other containing a strong solution of washing soda for cleaning the bottles and rinsing the india-rubber stoppers.
14. A set of suitable brushes for cleaning test bottles.
15. A 500 c.c. graduated measure, reading 5 c.c.
16. A 100 c.c. graduated measure reading 1 c.c.
17. A stock of sulphuric acid and amyl alcohol.
18. A reliable chemical thermometer (Fahrenheit).

A careful manager will always see that he has duplicates of those articles which are liable to be broken, particularly the pipettes and burettes.

The sulphuric acid should be of the quality known as "best white commercial," and should have at 15° C. or 60° F. a specific gravity of from 1.820 to 1.825. The former strength is used in summer, and the latter in winter. About a dozen Winchester quarts of the acid should be purchased at a time; it must be kept in stoppered bottles, as it loses strength if exposed to the air. If strong acid of specific gravity 1.840 has been purchased it must be diluted with water as follows:—1 part of water to 10 parts of acid for summer use, and 1 part of water to 12 parts of acid for winter use. Great care must be taken in diluting the acid. The best method is to take two litres, that is, 2,000 c.c., in a Winchester quart bottle, and to add thereto the necessary amount of water in small quantities at a time, taking care to shake the bottle after each addition. If all the water is added at one time the mixture will suddenly become very hot, and may crack the bottle. It is not necessary to have the temperature exactly 15° C. for testing the specific gravity, as any deviation from this temperature can be easily allowed for by adding or deducting .001 from the hydrometer reading for each degree above or below 15° C.

For testing separated milk, buttermilk, whey or cream, a weaker acid than the above should be used. An acid of about the proper strength may be made by adding one part of water to 55 parts of the 1.820 strength, or to 9 parts of the 1.840 strength. A very good indication that the strength of the acid is correct is afforded by the pale lemon colour which the fat in the neck of the test bottle then assumes. If the fat is very dark the acid is too strong, whereas if the fat is white and has beneath it particles of undissolved curd the acid is too weak.

The amyl alcohol (commonly known as fusel oil) should have a specific gravity of .815 or .816 at 15° C. or 60° F., and should boil at 126°–130° C. It should be colourless and free from fat. Its purity in this respect may be tested by mixing equal parts of it

and hydrochloric acid and whirling 22 c.c. of the mixture in a test bottle in the centrifuge. Any fat present will collect in the neck of the test bottle; but owing to its pale colour a very careful examination is necessary for its detection. For testing amyl alcohol a special form of hydrometer, the "Tralles," can be obtained. It should read 95-96 if the alcohol is of the proper strength. A Reaumur thermometer is enclosed in the body of this hydrometer, and it should be remembered that 12° R. correspond to 15° C. Corrections for slight deviations from the standard temperature are marked on each side of the scale of the thermometer.

### SAMPLING OF MILK.

No part of the work requires more care than the taking of such a sample of milk as shall truly represent the bulk. The mere pouring of the milk into the weighing vessel does not ensure thorough mixing. Prior to mixing, however, any particles of fat which may have become churned in transit should be removed. This done, the milk in each can should be agitated by means of a plunger kept for the purpose on a rack along side the platform. The contents of the cans are then poured into the weighing machine, and the sample immediately taken from the bulk. When the amount of milk delivered by one supplier exceeds the capacity of the weighing machine, a proportionate quantity should be taken out of each can (after using the plunger) and poured into a separate vessel, from which, after a further mixing, the final sample is taken.

The difficulty arising from clots of butter formed during transit might to some extent be obviated if suppliers would stir up any milk that has stood for a considerable time at the farm before despatch to the creamery.

The practice of paying for milk on the basis of a test made at irregular intervals is not satisfactory. The proper method is to take daily samples of each delivery and to let these accumulate for a fortnight or month, and then to test the composite sample. This method has all the advantages of daily testing and effects a considerable saving of labour. Moreover, each lot of rich milk and of poor milk is represented in the composite sample. For carrying out composite sampling the following articles should be provided:—

1. Two sets of bottles, of 8 oz. or 16 oz. capacity, according as the testing is to be done fortnightly or monthly.
2. A lock-up rack in which the bottles are kept.
3. A half-oz. tinned steel dipper to take the samples.

The need for two sets of bottles arises from the fact that one is required for collecting, while the other set is in use in the testing-room. The bottles should be of strong glass, without shoulders,

and should be furnished with loose glass covers. The mouth should be at least  $1\frac{1}{2}$  inches, and the bottom  $2\frac{1}{2}$  inches in diameter. Ground glass stoppers, or stoppers with cork bands, have proved unsatisfactory. The bottles must be securely labelled, and for this purpose nothing is better than painting on them figures about 1 inch high in Aspinall's black enamel.

To secure speed in sampling, hold the dipper in the right hand and the sample bottle in the left, lift off the cover with the right hand, fill the dipper, empty it into the bottle, and replace the cover.

Pellets of a preserving agent must be used to prevent souring. These pellets, consisting of a mixture of Bichromate of Potassium and Mercuric Chloride, can be purchased in two sizes, a .25 gramme size, to preserve 8 oz. for a fortnight, or a .5 gramme to preserve the same quantity for a month. A pellet should be placed in the bottle before the first sample is placed therein. It will be found an advantage to add at the same time a few grains of small shot, which will assist in the future mixing. When the sampling is over for the day give each bottle a gentle rotary motion. This serves the double purpose of mixing the contents and of preventing the formation of a layer of dry cream, which would be found difficult to deal with in the testing. The use of any excess of the preserving agent should be avoided, as this practice gives rise to difficulties in testing. The preserving agent is extremely poisonous, and the contents of the test and sample bottles should, therefore, be emptied in some safe place.

If a sour sample has to be tested add a few grains of shot and mix well. By means of a graduated measure take 100 c.c. and add thereto 2 c.c. of strong ammonia, mix well, and allow to stand until, on shaking, air bubbles rise as freely as they do in fresh milk. The sample may then be tested in the usual manner. The observed percentage of fat must be increased by 1-50th of itself to correct for the dilution by ammonia.

To send samples from separating stations to a creamery use 4 oz. narrow necked bottles, which, after the addition of a few grains of shot, should be completely filled to prevent churning in transit.

#### PREPARATIONS FOR TESTING.

When only a few tests are required, the pipettes specified in No. 4 of the equipment, on page 99, will be found sufficient. When, however, a large number of tests have to be made it will be found more convenient to measure the acid and amyl alcohol by the burettes specified in No. 5 of the equipment on page 99.

It is desirable that the testing room should contain more than one rest bottle of guaranteed accuracy, to serve as a standard of

comparison. Pipettes and bottles are tested under the supervision of the Director, National Physical Laboratory, Teddington, Middlesex, at a fee of 6*d.* for each pipette or test bottle. The carriage on such articles must be prepaid, and they should be marked "Physics Department, Metrology Division."

Any test bottle which gives mean results differing by more than .05 per cent. from the results obtained in the standardised bottle should be discarded.

#### USE OF APPARATUS.

To enable a manager to do full justice to his employers and to milk suppliers he should, by preliminary practice in the use of the graduated apparatus, make himself familiar with their construction and thoroughly adept in their use. Not until such time as he has acquired a complete command of the apparatus and operations should he presume to decide authoritatively on the milk supplied. The following short description of the construction and use of the apparatus may be found helpful; but practice alone will give the needful dexterity and accuracy. Useful practice may be obtained by repeated tests of the same sample of milk. If without any failures he is able to secure uniform results with one and the same sample he may proceed with the official testing.

The correct method of handling the pipette is as follows:—

**Pipettes.** Place the ball of the forefinger of the right hand on the upper end of the pipette—the finger being moist but not wet. Slide the thumb and other fingers as far down the stem as possible. In this way a firm and easy grip is ensured, and the slightest easing of the pressure of the forefinger will allow the liquid to flow out steadily. To fill, immerse the lower end of the pipette well into the liquid, apply the mouth to the upper end and draw up the milk until it stands slightly above the mark on the stem. Then deftly replace the forefinger before the liquid sinks. Some considerable practice may be necessary to enable the operator to control the flow of milk from the pipette, and to stop it when the liquid is at the mark. With clear liquids the bottom of the dark curve or meniscus should be at the mark, with opaque liquids, such as milk, the transparent edge of the liquids should be just above the mark.

In determining the position of the milk with relation to the mark, hold the pipette in a vertical position, with the mark on a level with the eye. In emptying the pipette keep it in a vertical position, and give it a rotary motion by means of the thumb and forefinger, so as to prevent any fine particles of fat adhering. Touch the side of the receiving vessel with the point of the pipette when

empty to get rid of the last drop. Do not blow through the pipette. The small amount of milk which remains in the point is allowed for by the maker in marking the pipette.

The neck of the test bottle is divided into seventy or ninety parts by lines of varying length. To facilitate

**Test Bottles.** reading each tenth mark is lengthened and each fifth mark slightly lengthened. In reading, hold the bottle in a vertical position in a good light and on a level with the eye. Press up or ease the stopper till the bottom of the column of fat coincides with one of the long marks. If now it is remembered that, when 11 c.c. of milk have been used in the test, the space between two long lines represents 1 per cent. of fat, and that between two short lines 0.1 per cent., it will be found extremely easy to read off the percentage of fat in any sample. A careful reader should be able to read to .05 per cent. Read from below upwards, and again from the top downward. A very common source of error occurs at this juncture owing to the column of fat moving its position during the time occupied in taking the two readings. The top of the fat column is curved. The bottom of the dark curve is the correct point to read when whole milk is being tested. The fat should be free from any appearance of bubbles at the bottom of the column. If bubbles are present they indicate that the whirling was insufficient. When a dirty layer or a layer of undissolved curd appears between the fat and the acid solution it indicates that the acid is too weak or that the bottle has not been sufficiently shaken—if black that the acid is too strong, that the milk has been dropped into the acid instead of being poured down the side of the bottle, that the bottle has been dirty, or that the stopper is in bad condition. Bubbles on the surface of the fat may be got rid of by giving the bottle a sharp tap on the table. If in attempting to remove the bubbles, or if in moving the stopper of the bottle while reading, any fat is spurted into the neck the bottle must be whirled again.

The marks on the test bottle are usually cut deeply into the glass, and should be quite distinct. If they are not distinct, a little black varnish should be rubbed over the neck, so as to make the divisions stand out boldly.

The india rubber stoppers should be reversible, and in order that they may be securely held in position the neck of the test bottle is usually moulded so that the inner surface resembles the thread of a screw.

For testing buttermilk or separated milk, a newer pattern of bottle, called a "precision" bottle, has been invented. In this form the upper portion of the stem is narrowed, and the space between each division correspondingly lengthened so that a small

percentage of fat can easily be read. These bottles should not, however, be used for testing whole milk.

Where a large number of samples have to be tested it will be necessary to measure the sulphuric acid and

**Burettes.** the amyl alcohol with burettes, and to discard the use of the pipettes supplied for measuring these reagents. The burette for the sulphuric acid should be replenished from a stock bottle placed on a stand sufficiently low to prevent syphoning. A little practice will be required to enable the operator freely to run off 10 c.c. of acid and 1 c.c. of amyl alcohol.

#### MILK TESTING.

Before beginning the test see that all the apparatus is perfectly clean, that everything is in its place, and that a test book, headed as follows, lies open on the table :—

TESTING RESULTS. DATE ———19——.

No. of test bottle.	No. of sample.	Per cent, fat.	Per cent, fat in repeat test.
	Twenty-four	lines to page.	

When a large number of tests have to be made twenty-four test bottles should be used simultaneously. The first operation is to run off into each bottle 10 c.c. of sulphuric acid, then by means of the pipette provided for the purpose 11 c.c. of the sample of milk mixed as described below is run into each, entering in the test book at once the number of the test bottle and the number of the sample.

There is no part of the testing which needs closer attention or more skill on the part of the operator than that of taking a fair specimen of the composite sample of milk. The need for care arises from several considerations. In the first place, cream will have risen, and may have dried on the surface through the neck of the bottle being left uncovered, or it may have dried on the side of the bottle through the sample not being properly mixed after each fresh addition of milk. It is difficult to incorporate thoroughly these dried portions with the rest of the sample. In the second place the shaking, to secure thorough mixing, gives rise to air bubbles which require a certain time to escape. It is needless to point out that if the milk be measured with air bubbles in it an inaccurate result will be obtained. Accordingly, it is necessary, after the com-

posite sample has been thoroughly shaken, to allow it to stand awhile; but in the interval cream may have again risen, and consequently some system must be adopted which ensures thorough mixing, freedom from air bubbles, and a minimum loss of time. To accomplish these ends the following procedure has been found most satisfactory: Before commencing to shake the samples look carefully for any in which the cream has dried on the side of the bottle, and also for any in which churning has taken place. In both these cases warm the sample to 100° F. to melt the fat, then shake vigorously, and cool while shaking under the water tap, taking great care that no water enters the bottle. Now arrange all the samples in numerical order, and commence to mix the contents of each bottle by shaking vigorously, using the palm of the hand as a stopper. After the first three bottles have been shaken return to No. 1, which by this time should be free from air bubbles. Gently invert bottle No. 1, again closing with the palm of the hand. Replace the bottle on the table, and take from it for the test 11 c.c. of milk free from air bubbles. Now shake the contents of bottle No. 4, after which return to No. 2, and take a sample, then shake No. 5, then sample No. 3, and so on. Always examine the milk in the pipette. If any bubbles are observed, empty, mix the sample as described above, and refill the pipette.

After the milk 1 c.c. of amyl alcohol is added to each bottle. If the operations have been properly performed there should be now three layers of liquid each sharply defined. To secure this the milk and the amyl alcohol should be run down the side of the test bottle and not dropped directly into it. The bottles are now securely closed by the rubber stoppers, which should be dry, soft, and free from cracks and granular matter. Each bottle in turn is then well shaken, the thumb being held on the stopper to prevent slipping. As considerable heat is developed a piece of thick flannel, about 4 inches square, with a hole in one corner for the thumb, may be used to protect the hand. When the contents of a test bottle are well mixed turn it upside down to permit the acid in the neck to run into the body of the bottle. Shake till the curd is completely dissolved.

When less than half a dozen samples are to be tested the bottles may be immediately placed in the centrifuge. If, however, as is usually the case, a larger number of bottles are in use, each should be placed, stopper end up, as soon as it is mixed, in the water bath at a temperature of from 65° C. to 70° C. (149° F. to 158° F.). The water in the bath should be up to the shoulders of the bottles. When a set of bottles has thus been prepared place them in the centrifuge and whirl for three minutes at a speed of from 800 to 1,000 revolutions per minute according to the diameter of the centrifuge. In cold weather the body of the centrifuge should be



heated, or the samples will cool too quickly to allow complete separation of the fat. The speed of the centrifuge should not be excessive. A few trials will enable the operator to determine the correct speed. When all the places in the centrifuge are not required the bottles should be so distributed that the weight is balanced.

The results will not be correct if the bottles are allowed to cool down before reading. This is a common source of error, causing differences of from .05 per cent. to .1 per cent. It is therefore necessary to place the bottles again in the water bath, but this time with the narrow end upwards. The temperature of the bath should be 65° C. (149° F.). As each bottle is read, promptly enter the reading in the test book.

In testing separated milk or buttermilk, "precision" bottles and sulphuric acid 1.816 Sp. Gr. should, as already indicated, be used, and the reading at the upper curve of the meniscus should be taken. With these milks the bottles should be shaken much longer, and should be left in the water bath for from five to ten minutes before whirling. In addition, the whirling should be continued for at least nine minutes. Should the centrifuge have no provision for heating the bottles while in motion, they should be taken out at the end of each three minutes and heated in the water bath. Should dirt or curd (which always contains fat) appear below the fat the test must be repeated.

#### CREAM TESTING.

The estimation of fat in cream presents exceptional difficulties, and is liable to more serious errors than milk testing, and no one who is not an adept in the use of delicate measuring apparatus can be relied upon to determine the value of cream. With great care, and duplicate testing, however, the amount of fat in cream may be determined with an accuracy sufficient for commercial purposes.

What has been said with regard to the need for care in the testing of milk applies with equal force to the testing of cream.

The most accurate method of determining the percentage of fat in cream, especially in cream containing more than 85 per cent. of fat, or cream which has become thick owing to souring, is that known as the "weighing method."

The following apparatus is required at a creamery where this method of testing cream is adopted :—

1. A chemical balance, by a standard maker, capable of weighing 250 grammes and sensible to 5 milligrammes.

**Equipment.** The balance should have an open beam with supports and adjusting screws, eccentric for lifting, knife edges and bearings of agate, needle pointer, arrestments

for the stirrup suspenders, plumb bob, and levelling screws, pans of 10 cm. diameter, and a glass case with front sliding door. This must be kept in a dry room, and on a table or shelf free from vibration.

2. Box of weights in phosphor bronze, 5 milligrammes to 100 grammes, fractions of grammes of German silver or aluminium wire, with forceps.

3. Three 300 c.c. flasks graduated, with 1 mark on the neck, with india rubber stoppers.

4. The apparatus for the estimation of fat in milk and cream, mentioned above under the heading, "The Testing Room and its Equipment."

5. Six 100 c.c. Erlenmeyer flasks.

6. Six Gerber test bottles, with the square graduated neck and narrow inner tube throughout for accurate readings. The test bottles to be certified correct with the Kew mark on each bottle.

7. One half-dozen test tube cleaners with india rubber ends.

When the whole of the cream from a separating station is delivered in one can, or when an empty cream vat

**Sampling.** is available into which the contents of all the cans from a separating station may be poured, or when the new milk receiving tank is so arranged that the whole of the cream from a separating station can be poured into it and then pumped to the cream room, sampling offers no difficulty. The whole of the cream from a separating station can be thoroughly mixed together, and a sample taken from the mixture will, accordingly, truly represent the bulk. In order to obtain a true sample when there are no facilities for mixing together the whole of the contents of the cans, the following procedure should be adopted :—

1. Thoroughly stir the contents of each can.

2. Take from each can a quantity of cream proportionate to the volume or weight of cream in the can, i.e., if a pint is taken from a can containing 6 gallons of cream, a quart should be taken from a can containing 12 gallons.

3. Mix together thoroughly the quantities taken from each can until the mass is uniform.

4. A sample taken from the mixture will truly represent the quality of the cream.

Having obtained a true sample of the cream, and allowed it to stand for an hour in a sample bottle with a wide

**Testing the Sample.** mouth in order that any air bubbles may escape, thoroughly stir the sample with a spoon or preferably with a test tube cleaner with india-rubber end, taking great care not to shake the bottle so as to cause air

bubbles. Should the cream be very thick, owing to its containing a high percentage of fat or its being partially sour, it may be thinned by warming the bottle up to about 100° F.

The sample being now ready, take a clean 300 c.c. graduated flask, the exterior of which should be perfectly dry, the interior need not be dry, but must be clean. Wipe the exterior of the flask with a clean dry silk or linen cloth, free from lint, to remove any dust. Place the flask on the pan of the balance and determine its weight to the second place of decimals. Add between 40 and 45 grammes of the thoroughly mixed sample of cream, and determine the weight of the flask and the added cream with the same accuracy as before. Enter the results in a notebook as follows:—

(2) Weight of flask and cream	..	..
(1) Weight of flask	..	..

---

Difference = weight of cream .. ..

The flask should now be removed from the pan of the balance, and clean water poured in till the flask is filled to the graduation mark on the neck. If the water is poured in carefully and slowly down the inside of the neck of the flask held at an incline, and if the cream has been properly mixed without incorporating air bubbles, there will be no difficulty in adjusting the level of the liquid to the mark on the neck of the flask. A pipette may be advantageously used in adding the last few drops. The production of air bubbles by violently mixing the cream or pouring the water straight down the neck of the flask into the cream will render the adjustment of the level of the contents with the mark on the neck of the flask a matter of difficulty. It is advisable to add the water in several portions, giving the flask a rotary motion in order to mix the cream with the water, but on no account should the mixture be shaken up at this stage or be given such a violent motion as would cause air bubbles. Any cream which may have adhered to the interior of the neck of the flask above the mark should be washed down by the added water. After adjusting the level of the liquid insert the rubber stopper and shake the flask well to mix thoroughly the cream and water. Now quickly pour out a quantity into one of the small Erlenmeyer flasks. This quantity should be allowed to stand for a few minutes to permit any air bubbles to rise. Having done so, give the flask a rotary motion to mix any particles of fat which may have risen to the surface, then quickly insert the point of an 11 c.c. pipette and withdraw the quantity required for testing. After adjusting the level of the liquid in the pipette to the mark, one finger should be placed on the point and another on the top of the pipette. The pipette should then be turned upside down and held so for a few moments. The object of this is to gather any

minute particles of partially churned fat in the point of the pipette. By quickly inverting and discharging the contents into a Gerber test bottle, containing the required quantities of acid and amyl alcohol, the small particles will be washed into the test bottle instead of remaining on the side of the pipette. If when the pipette is inverted the contents run down the pipette to the lower finger, the suction end of the pipette is too wide and unsuitable for the work.

The concluding procedure is practically the same as in the case of milk testing, but a longer whirling is sometimes necessary, and great care should be taken to read off the percentage of fat at the right temperature, for which purpose a water bath is absolutely necessary. The length of the column of fat should be read to a quarter of one division, a degree of accuracy which the special Gerber bottles having the narrow bore throughout the entire length of the graduated scale easily enable an operator to obtain. Duplicate tests should always be made, and the readings obtained should not differ by more than .05 per cent., a good worker easily obtaining identical results.

The following formula will give the accurate percentage of fat in cream :—

$$\frac{\text{Percentage of fat in cream} \times \text{Percentage of fat found in diluted cream} \times 1.032 \times 300 \text{ c.c.}}{\text{Weight of cream taken.}}$$

No other correction is required, and the calculated results arrived at by duplicate tests of the same cream should not differ by more than .25 per cent.

Another method, involving no other appliances than those used

Testing—	for milk, consists in carefully diluting 11 c.c. of
A Second	the cream so that it may be tested as if it were
Method.	ordinary milk, and afterwards making the proper allowance for the degree of dilution.

The peculiarity in the case of cream which gives rise to most of the difficulty in testing is its viscosity, a property which greatly favours the retention of air bubbles. Accordingly, before cream can be tested with accuracy it must stand at least two hours after separation, so that the very fine air bubbles, often so fine as to escape the eye, may have had time to escape from the mass. Cream from a separating station should be thoroughly mixed before the sample is taken, and should not contain more than .2 per cent. of acid.

Before taking the quantity requisite for a test, the sample which should have stood for at least half-an-hour, must be thoroughly mixed, and to do so it should be first warmed, if necessary, to 68° F.,

and then carefully stirred with a spoon. In dealing with very viscous cream it may be necessary, first, to warm it to 122° F., and afterwards to cool down to about 68° F., before taking the sample. On no account should the sample be shaken or air bubbles will be included. When properly mixed, take the test sample with a dry pipette which has been certified accurate. Draw the cream slowly into the pipette and only slightly above the mark. Before adjusting the liquid to the mark carefully wipe off the cream adhering to the outside of the pipette. When the top of the column of cream has been lowered to coincide with the mark, remove the drop hanging from the point of the pipette and discharge the cream into a clean dry bottle or conical flask of about 300 c.c. capacity. The same pipette should then be filled with clean water exactly to the mark, and the contents delivered into the cream. Again fill the pipette with clean water and deliver into the cream. This must be repeated till the mixture of cream and water contains less than 7 or 9 per cent. of fat, according as the test bottles are graduated for 7 or 9 per cent. The measuring of the water into the cream will, of course, ensure that no cream remains in the pipette. Generally, it may be stated that for a 25 per cent. cream two to three pipettefuls of water will be sufficient; for a 25 per cent. to 35 per cent. cream three to four pipettefuls; for a 35 per cent. to 45 per cent. cream four to six pipettefuls, and so on. Excess of water above that required to dilute the cream to below 7 or 9 per cent. should be avoided.

Extreme care is now required in taking from the diluted cream the 11 c.c. with which to make the test. The need for care arises from the fact that the fat in a mixture of cream and water rises very rapidly, while a violent mixing gives rise to air bubbles which completely vitiate the results. The best method is first to shake the mixture thoroughly, allow it to stand for a few minutes, and then mix again by a gentle rotary motion of the vessel, and immediately draw off the 11 c.c., which should then be delivered into a test bottle, in which 10 c.c. of sulphuric acid has previously been placed, as in ordinary testing. The further procedure is identical with that followed in the case of milk.

The percentage of fat should be read quickly at 149° F. The bottles are then immediately placed in the centrifuge, heated, and again read at 149° F. If the two readings do not agree the sample should be whirled and read a third time.

It is absolutely necessary to make two separate dilutions of the sample from each consignment of cream, and two tests of each dilution. Thus, four estimations of each cream are obtained, and, provided that the extreme difference between these is not greater than .1 per cent. the average of them may be taken to represent the percentage of fat in the diluted sample.

To obtain from these data the percentage of fat in the original

cream, multiply the average of the four tests by a number greater by one than the number of pipettefuls of water added, and correct the figure thus found from the following Table :—

TABLE OF CORRECTIONS.

Per cent. Fat found.	Correction to be added.	Per cent. Fat found.	Correction to be added.	Per cent. Fat found.	Correction to be added.
20	.12	30	.48	41	1.17
21	.16	31	.54	42	1.24
22	.19	32	.60	43	1.32
23	.23	33	.66	44	1.40
24	.26	34	.72	45	1.48
25	.30	35	.77	46	1.56
26	.34	36	.83	47	1.64
27	.38	37	.90	48	1.72
28	.42	38	.96	49	1.80
29	.45	39	1.03	50	1.89
—	—	40	1.09	—	—

In carrying out this test the following sources of error should be avoided :—(1) Sour cream ; (2) use of wet pipettes or flasks when first measuring out the cream ; (3) careless mixing, whereby air bubbles are drawn into the pipette along with the cream ; (4) drawing the cream too far above the mark in the pipette ; (5) loss of fat when adding water for dilution ; (6) imperfect mixing of the diluted cream ; (7) fine particles of fat left on the pipette when the diluted cream is run into the test bottle ; (8) reading the results at too low or too high a temperature.

#### RAPID METHOD OF ESTIMATING FAT IN CREAM.

The following direct method can be quickly performed and is sufficiently accurate for general purposes.

The actual testing is performed in exactly the same way as with milk except that 5 c.c. of cream are taken and special test bottles are employed, graduated to give the percentage of fat in the cream direct, without further calculation or correction.

The following apparatus will be needed :—

Three cream test bottles reading from 0 per cent. to 40 per cent. with rubber stoppers.  
**Apparatus Required.** Three cream test bottles reading from 0 per cent. to 50 per cent. with rubber stoppers.

Two 5 c.c. pipettes for cream.

Two 5 c.c. pipettes for water.

Centrifuge, burettes and chemicals as used in testing milk.

To perform the test 10 c.c. of acid are run into the test bottle, 5 c.c. of cream are then drawn into a pipette, the outside of the

pipette carefully wiped dry, and the cream allowed to flow slowly into the test bottle, a second 5 c.c. pipette is then filled with water and the cream pipette carefully rinsed down with it, the upper end of the cream pipette must be sufficiently wide to take the lower end of the water pipette, and by gently turning the cream pipette round, the last particle of cream can be washed into the test bottle, 1 c.c. of amyl alcohol is then added and the bottle shaken and whirled in the centrifuge and the fat read off. Bottles graduated to read within .5 per cent. of fat can be obtained, and the results of two separate tests should agree within this limit.

Instead of a pipette for measuring the cream, a bulb with two necks holding 5 c.c. known as a pycnometer can be used. This bulb which is provided with a shank fitting into the cork of the test bottle, is filled by means of a pipette, the outside wiped dry and then transferred bodily to a test bottle, containing 10 c.c. of acid, 5 c.c. of water and 1 c.c. of amyl alcohol, the test bottle is then shaken and whirled in the ordinary way.

#### CLEANING THE TEST BOTTLES.

A capable manager may often be known by the state in which he leaves the testing room after the day's work: his bottles are carefully washed and put away, every piece of apparatus is clean and in its proper place, his working bench is free from dirt or from liquids spilt during testing, and the centrifuge is cleaned and carefully wiped dry. On the other hand, the manager who leaves everything uncleaned or in a half-cleaned condition, bottles greasy, corks unwashed or wet, reagents out of place and the bench sloppy, is utterly unworthy of his position, and it is not possible that the milk suppliers can receive justice if they are paid on his figures.

Test bottles, to be thoroughly cleaned, should be emptied while the contents are hot, and to secure this they should be kept stopper end up, in the hot-water bath after reading at the close of a test. Before emptying they should be vigorously shaken so as to loosen the white deposit under the stopper. They should then be well rinsed out with hot water. This will often be sufficient to clean them; but if any of them shows any signs of greasiness it should be soaked in a strong solution of soda and afterwards rinsed out with hot water. If signs of greasiness are still observable the test bottles should be treated with a hot mixture made by dissolving a large preservative pellet in 10 c.c. of water and adding an equal quantity of sulphuric acid, the heat generated by mixing the acid and solution will be sufficient for the purpose of cleaning the test bottles the first time. After use the mixture can be stored in a glass stoppered bottle and used over again. The test bottles filled with the cold mixture but without the rubber stoppers should be heated in the water-bath for about twenty minutes. After this treatment the test bottles must

be rinsed thoroughly with hot water. The mixture of acids and pellets being highly corrosive and poisonous, great care must be taken in its use and disposal.

Test bottles cannot be satisfactorily cleaned if they are allowed to cool before being emptied. The difficulty of obtaining a clear reading is often due to dirty bottles. Moreover, unseen fat left from a previous test in a dirty bottle is very frequently a source of considerable error.

The rubber stoppers need special attention. Immediately after the test these stoppers should be thrown into a solution of washing soda for a few minutes, then washed in hot water, and carefully dried. If left unwashed they become hard and useless. The dirty layer which is often seen under the column of fat is frequently due to granular matter from dirty stoppers.

### THE ACIDITY TEST.

This test is based on the chemical fact that alkalis, such as caustic soda, the carbonates of soda, lime, etc., combine with acids such as sulphuric, hydrochloric and lactic acids, etc., in certain definite proportions, and that an "indicator" or "tell-tale" is used to show when the combination of the acid and alkali is complete. When the alkaline or acid solutions are made of known strength it is thus quite feasible to determine the quantity of acid or alkali, respectively, present in any liquid.

The principal change which takes place during the souring of milk, the ripening of cream, and in the manufacture of certain types of cheese is the conversion of the milk sugar into lactic acid by bacteria. Although this fermentation is not responsible for all the changes in flavour that take place, it is so closely related to them that it has been found possible to use the knowledge gained by the measurement of the acidity of milk, cream, or whey to control the manufacturing operations in a creamery or a cheese factory.

Forty parts of caustic soda always combine with 90 parts of lactic acid and in no other proportions, so that a solution of caustic soda of known strength can be utilised for the determination of the amount of lactic acid present in milk, cream, or whey, provided no other factors intervene. Unfortunately the test is not an absolute measure of the lactic acid formed for the following reasons: Some of the acid salts in milk act as an acid and neutralise a certain quantity of the alkali. The casein of milk or some of its derivatives may act as a base and unite with some of the lactic acid formed and may also act as an acid by combining with some of the alkali. For example, fresh milk from the udder shows a certain amount of acidity although lactic acid may be absent.

The test is not, however, sensitive enough to enable a cheese-maker to dispense with the "rennet" test for determining the ripeness



of milk for cheese-making, for while the amount of lactic acid formed during the ripening process is insufficient to be detected by this method, that changes are taking place in the milk is indicated by the "rennet" test. For instance, it has been found that while the apparent acidity of the milk has not changed the rennet test may have changed as much as 30 per cent. to 80 per cent. Hence in this particular instance the "rennet" test is the more reliable as evidence when to rennet the milk for making cheese.

Again, the "indicator" used is sensitive to other organic and inorganic acids, acid salts, and not to lactic acid only, so that when measuring the acidity it is impossible to state how much or little of this is absolutely due to the formation of lactic acid.

Notwithstanding all these drawbacks the test is extremely useful. By its aid we can select milk which will stand pasteurisation without curdling, determine whether cream from separating stations is delivered in a good condition, decide whether cream is sufficiently ripened for churning, and control the various stages of cheese-making after renneting has taken place.

The following apparatus will be required for conducting the acidity test:—

1. One burette 50 c.c. graduated to  $\frac{1}{10}$  c.c. with rubber connection, pinch cock and stand, and small glass funnel for filling burette.
2. Two 50 c.c. pipettes for milk.
3. Three "Erlenmeyer" flasks (200 c.c.).
4. One 2 c.c. pipette for "Indicator."
5. One Winchester quart of  $\frac{N}{4}$  caustic soda solution.
6. One half-pint bottle of phenolphthalein solution (2 per cent. phenolphthalein in alcohol).

Wash all apparatus clean and rinse out burette with a few c.c.'s of the caustic soda solution, then fill burette to

Carrying out the "0" mark, taking care that no bubbles of  
Test. air are allowed to remain in the rubber connection.

Stir samples of milk or cream to be tested and pipette out 50 c.c. into one of the "Erlenmeyer" flasks (in case of very thick cream the pipette should be rinsed out with a few c.c.'s of clean water, and the rinsings added to the contents of the flask).

Add 2 c.c. of the phenolphthalein indicator to the milk in flask and mix by giving the flask a rotary motion. Caustic soda should then be added from the burette, drop by drop, mixing constantly, till the milk changes to a permanent pink colour. The number of c.c.'s of caustic soda solution required should be noted.

If it is assumed that the alkali has combined with the lactic acid, then as each c.c. of  $\frac{N}{4}$  caustic soda will neutralise 0.0225 grammes of lactic acid, the percentage is determined as follows:—

*Example.*—If 50 c.c. of cream require 7.5 c.c. of the caustic soda

solution, then the quantity of lactic acid in 100 c.c. of the milk would be  $7.5 \times 2 \times .0225 = .3375$  grammes, or approximately, .34 per cent.

If allowance is made for the difference in density between milk and water, the percentage of lactic acid would be reduced to :—

$$\frac{.3375 \times 100}{103} = .327 \text{ or } .33 \text{ per cent.}$$

Nothing is gained however by assuming that the acidity is wholly due to lactic acid. It is simpler to express the result in the number of c.c.'s of  $\frac{N}{4}$  caustic soda solution required to neutralise 50 c.c.'s of milk, cream, or whey. The maximum quantities of the solution that should be required are as follows :—

For milk delivered at a creamery, 4.5 c.c. = .2 per cent. calculated as lactic acid.

For sweet cream, 3.5 c.c. = .16 per cent. calculated as lactic acid.

For mildly ripened cream, 7.0 c.c. = .31 per cent., calculated as lactic acid.

For fully ripened cream, 10.0 c.c. = .45 per cent., calculated as lactic acid.

It will thus be seen that if more than 4.5 c.c. of the solution is required to neutralise 50 c.c. milk, the milk would be liable to "crack" on being heated, and would not therefore stand pasteurisation; if in the case of sweet cream 3.5 c.c. is exceeded the cream has not been thoroughly pasteurised, or it has been inoculated in some way after pasteurisation and is partially ripened.

Cream containing 33.3 per cent. fat has been taken as a standard in the above cases. In order to show the same development of acid in the serum, if the percentage of fat is above this figure the quantity of  $\frac{N}{4}$  caustic soda solution required (i.e. the acidity) should be proportionately less; if below 33.3 per cent. the quantity should be greater. For instance, the same degree of ripening is indicated in creams containing the following percentages of fat and requiring the quantities of  $\frac{N}{4}$  caustic soda solution shown :—

25 per cent. fat	..	..	7.9 c.c. Solution.
33.3	..	(standard)	.. 7.0 c.c. ..
40	..	..	.. 6.3 c.c. ..
50	..	..	.. 5.2 c.c. ..

In the case of creams containing more or less than 33.3 per cent. fat adjustment must be made as in the following example before their acidity can be compared with the maximum figures shown above :—

*Example.*—To determine whether a cream containing 25 per cent. fat and requiring 7.9 c.c. of  $\frac{N}{4}$  caustic soda solution to neutralise 50 c.c. is mildly ripened calculate as follows :—

$$7.9 \text{ c.c.} \times \frac{100-33.8}{100-25} = 7.9 \times \frac{66.2}{75} = 7 \text{ c.c.}$$

As the resultant figure is not in excess of the figure given as maximum in above table, the cream is mildly ripened.

#### DETERMINATION OF WATER IN BUTTER.

The "Sale of Butter (Ireland) Regulations, 1902" provide that "where the proportion of water in a sample of butter exceeds 16 per cent., it shall be presumed for the purposes of the Sale of Food and Drugs Acts, 1875 to 1899, until the contrary is proved, that the butter is not genuine by reason of the excessive amount of water therein."

Since the "Regulations" came into force most merchants when purchasing butter require a guarantee that the butter does not contain more than 16 per cent. of moisture. Consequently it is important that managers of creameries should test a sample of butter from each churning in order to meet the requirements of such customers and to protect themselves.

For the determination of water in butter a simple method, which, if carefully carried out, will give results within one half per cent. of strict accuracy, consists in weighing out 10 grammes of the butter in a small aluminium cup. The cup containing the butter is then heated over a spirit lamp till the water has evaporated, i.e., till all bubbling has ceased and the curdy matter turns slightly brown. When thoroughly cool, the cup and contents are again weighed. The loss in weight is due to moisture and the percentage of moisture is then calculated therefrom.

The following apparatus is suitable for the carrying-out of the test:—

**Apparatus.** 1. A small balance with agate knife edges and planes capable of weighing 50 grammes, and sensible to 0.01 gramme; pans three-inch diameter. This should be kept in a dry room and on a table free from vibration.

2. A set of gramme weights, 20 grammes to 0.01 gramme.

3. Two aluminium cups,  $2\frac{1}{2}$  inch diameter  $\times$   $2\frac{1}{2}$  inch deep.

4. One nickel-plated spring wire tongs for gripping the cup round the mouth.

5. One four-ounce metal spirit lamp with narrow tube wick-holder.

6. One pint of methylated spirit.

The following apparatus is more satisfactory for creameries. A portion of this apparatus can, moreover, be used for the accurate determination of fat in cream:—

1. Chemical Balance.—In glass case with counterpoised front

sliding door, provided with levelling screws and plummet. Brass frame with supports and adjusting screw, agate knife edges and planes, eccentric for lifting needle pointer and scale, movable pans, 10 c.m. diam. To weigh 250 grammes and sensible to .005 gramme. This must be kept in a dry room and on a table or shelf free from vibration.

2. Weights.—One box of weights 1 milligramme to 100 grammes, large weights of phosphor-bronze, fractions of grammes of German silver, with forceps.

3. One desiccator bell jar, 25 c.m. diameter, asbestos plate, glass plate, and sulphuric acid dish.

4. Two aluminium cups,  $2\frac{1}{2}$  inch diameter  $\times$   $2\frac{1}{2}$  inch deep.

5. One nickel-plated spring wire tongs for gripping the cup round the mouth.

6. One 4 oz. metal spirit lamp with narrow tube wick-holder.

7. One quart of methylated spirit.

*Note.*—The methylated spirit should be best quality, not that known as “methylated finish,” and should burn without forming soot.

There are several types of apparatus for the determination of the water in butter by a direct reading. There is no objection to these provided they are well made and the knife edges and planes of the balances are of agate. The majority, however, cannot be recommended, as they are flimsily constructed with steel knife edges, rapidly become inaccurate, and cannot be utilised for other purposes, such as cream testing, while costing nearly as much as a reliable balance suitable for carrying out all the analytical work in a creamery.

#### PASTEURISATION OF MILK OR CREAM.

Pasteurisation of milk, etc., necessitates heating the milk to such a temperature for a sufficient time to destroy most of the bacteria present, and then cooling the liquid to a low temperature so that any spores present will not develop.

While a temperature of 150° F. for half-an-hour will suffice, in creamery practice, where the highest temperature in a continuous flow heater is only momentarily attained, it is essential to heat to at least 176° F., and to provide a safe margin this temperature should be exceeded, say 185° F. upwards. These high temperatures can only be adopted with satisfactory results when the cooling facilities are sufficient to bring down the temperature to 50° F. or lower. If the cream is not properly cooled the “texture” of the butter will be inferior. When milk is heated to temperatures of 176° F. and upwards, not only are most of the bacteria present destroyed, but,

in addition, certain changes take place in the milk which may be detected by chemical reagents.

It is desirable that managers of central creameries should be in a position to test cream from separating stations in order to ascertain whether such cream has been heated to a sufficiently high temperature before despatch. A thermometer will enable the manager to determine if it is well cooled.

#### TEST FOR PASTEURISED MILK OR CREAM.

Take about 10 c.c. of the milk or cream in a clean test tube and add as much powdered paraphenylenediamine as will go on the tip of a small blade of a pocket-knife, shake well and allow to stand for a few minutes, then add a few drops of hydrogen peroxide (10 vol.). If milk or cream has been heated above 176° F., no immediate change of colour will take place, but if sample has not been heated to this temperature the milk or cream will change at once to a dark blue colour.

A few tests with samples of milk and cream which have been heated to various temperatures and with a few samples of pasteurised milk to which varying quantities of raw milk have been added will readily afford data on which a judgment may be based.

#### ESTIMATION OF YIELD OF BUTTER.

A careful manager will compare the *actual* yield of butter from milk or cream with the *calculated* quantity which should be produced.

The formulae given under may be used to ascertain the minimum yield :—

1. *Formula for calculating the yield of butter from test of a "drip" or composite sample of the milk delivered.*—The "drip" sample should be from at least .5 per cent. of the total quantity of milk supplied. Gallons of milk  $\times 10.32$  = lb. of milk. F = the percentage of fat found in the "drip" sample, or in the composite sample, as the case may be.

$$\text{Lb. butter} = \frac{\text{lb. milk (F—1)} 1.16}{100}$$

2. *Formula for calculating the yield of butter from cream when the weight of cream and the percentage of fat therein are known.*—Fc = Percentage of fat in cream.

$$\text{Lb. butter} = \frac{\text{lb. cream (Fc—3)} 1.17}{100}$$

3. *Formula for calculating the number of gallons of milk required to yield 1 lb. butter (i.e., the "Produce").*—F = Percentage of fat in milk.

$$\text{"Produce"} = \frac{8.3448}{F - 1}$$

## CATCH CROPS.

### ADVANTAGES OF CATCH CROPS.

The Department desire to bring under the notice of farmers the great benefit to be derived from the cultivation of catch crops.

The production of a catch crop between two regular crops of the rotation possesses numerous advantages. A larger bulk of food is produced on the farm, thus enabling more stock to be kept ; more manure is made, and consequently the land can be maintained in a higher state of fertility ; while the continued growth of crops, and the extra tillage necessary, prevent the spread of weeds, and the land is therefore kept cleaner.

A regular supply of green fodder is particularly valuable, especially in dairying districts. In summer the fodder can be used to supplement the pastures, thus allowing more land to be brought into cultivation ; while for dairy cattle during the winter and spring months the value of green fodder can scarcely be over-estimated.

Early potatoes are now grown to a larger extent in Ireland than heretofore, and this practice can be strongly recommended as, in addition to the return obtained from the potatoes, it offers a favourable opportunity of raising at small expense a second crop, which provides green food for cattle during the spring. As early potatoes are lifted in June or July, there is little difficulty in afterwards securing an excellent second crop. Moreover, after digging the potatoes the land is in good order, and little further preparation is necessary for the next crop. Further, early potatoes are heavily manured, and the succeeding crop can generally be grown without the application of any manure.

The following notes refer to catch crops which might be cultivated successfully in Ireland.

### RYE.

Rye follows well after corn, potatoes or summer vetches, and is usually sown in August or September for cutting green in April or May. It could be followed in turn by sprouted potatoes, mangels, cabbages, turnips, rape, or summer vetches, to all of which crops a dressing of farmyard manure should be applied.

The preparation of the land for rye is similar to that adopted in the case of an ordinary grain crop, and the seed is sown at the rate of from 14 to 16 stones per statute acre. When rye follows potatoes no further manure will be necessary in autumn. If, however, rye follows corn or is sown on land in poor condition dung should be ploughed in before sowing the seed, or if dung is not available a dressing of 4 cwt. superphosphate or basic slag and 2 cwt. kainit should be harrowed in at the time of sowing the seed. Nitrate of soda, at the rate of 1 cwt. per statute acre, should always be applied towards the end of February or early in March.

It is not generally advisable to sow a large area of rye, as if the crop is not consumed within a short period after coming into ear the straw becomes coarse and woody and unsuitable for feeding. This drawback can be overcome to some extent by making sowings at different dates during August and September. On most farms, however, a small plot of rye might be grown with advantage after the potatoes dug during the summer.

It is necessary to warn farmers against sowing old rye seed. Seed of the current year's harvest should always be procured for sowing in autumn.

### VETCHES.

This crop can be grown on almost any soil and in every situation. Vetches are particularly valuable on small farms as a crop for cutting green and feeding to stock in the house. They are relished by horses, cattle, and pigs; they possess a high nutritive value, and are specially suitable for the production of milk.

There are two varieties, the Winter Vetch and the Spring Vetch. The winter variety should be used for autumn sowing, as the spring vetch is not sufficiently hardy to withstand frost.

### WINTER VETCHES.

Winter vetches is perhaps the most suitable crop for sowing after lea oats, wheat or barley; if sown on the stubble it can be cut in the following spring in time to allow the land to be prepared for the regular crop of turnips. For winter vetches it is advisable to apply farmyard manure. A dressing of from fifteen to twenty loads per statute acre should be spread on the stubble, and the land ploughed six inches deep. If farmyard manure is not available in autumn 4 cwt. superphosphate or basic slag and 2 cwt. kainit, or 6 cwt. of potassic superphosphate may be harrowed in at the time of sowing the seed. The seed is sown and covered in exactly the same manner as an ordinary grain crop. To prevent the vetches

lying on the ground and rotting in the bottom, it is advisable to sow some other crop with them. For the winter crop the vetches should be mixed with rye or wheat; oats are not suitable. The quantity of seed to sow is from 7 to 8 stones of vetches and from 4 to 5 stones of rye or wheat per statute acre. From 2 to 4 stones of winter beans or peas are often added; these plants possess a high feeding value, and the beans serve the same purpose as the rye, and help to keep the vetches from becoming "laid" or "lodged" in spring.

To obtain the best results it is very important that winter vetches should be sown as soon as possible after the corn crop has been harvested, viz., August or September. They give the heaviest crop when sown early on lea stubble and when a dressing of farmyard manure has been applied. A dressing of 1 cwt. nitrate of soda per statute acre should be given in spring.

#### SPRING VETCHES.

Spring vetches may be sown from February to June. They follow well a crop of rape, thousand-headed kale or cabbages which have been consumed early in spring. It is not necessary to apply farmyard manure for spring vetches. A dressing composed of 3 cwt. superphosphate or basic slag and 2 cwt. kainit per statute acre, harrowed in with the seed, will give good results. If the land is poor, 1 cwt. of sulphate of ammonia may be added. Three sowings of spring vetches will give a regular supply of green fodder from the time the winter-sown crop is ready to cut in April or May until the following September. The first sowing may be made in February, and the last sowing early in June. Oats, instead of rye, should be sown with spring vetches, and, as with the winter crop, a small quantity of beans or peas may be added. The quantity of seed to sow per statute acre is from 7 to 8 stones vetches and from 4 to 6 stones of oats.

Vetches are best for feeding when they are in flower and before the pods have ripened; after this stage they become coarse and woody, and less valuable as food. Vetches are often cut and fed to cattle on grass, but they can be most economically used when fed in the house. They should be brought in from the field twice daily—morning and evening—stored in a cool place and not thrown down in heaps, otherwise they become heated, and they are not then relished by stock. In feeding to cows it is advisable to keep the cows in the house all day, to give three or four feeds of vetches, and to allow them out on to the pasture after milking in the evening. If the cows are kept on the pasture night and day, a feed of vetches should be given in the house at each time of milking. All soiling



crops require to be fed sparingly to cows, and in small quantities at a time until the animals become accustomed to the food. The quantity to be given must be regulated by the appetite of each individual animal. Calves may be housed and the same method of feeding adopted as with cows. If, however, no suitable house is available for calves, a crib may be put in the pasture field and a bundle of vetches carried to it morning and evening. Vetches are an excellent food for farm horses; there is, however, great danger of the animals developing "weed" if vetches are given in quantity when the horses are not working. The risk is greater when the horses are idle from Saturday to Monday; if, therefore, they cannot be turned out to pasture they should, when not working, be well exercised, or some other food should be substituted for the vetches. Further, vetches should be allowed to lie in the swath for about 12 hours after cutting before they are fed to horses, otherwise the animals may suffer from colic or "gripe."

Pigs eat vetches readily, and the crop may be fed largely to them, particularly to sows and store pigs.

#### TURNIPS.

Aberdeen and white turnips may be sown after early potatoes. The land is drilled, and the turnips sown in the ordinary way, without any manure. The turnips provide feeding from October to January.

Hardy green turnips, which are commonly known as "starters," are very suitable, for an autumn-sown catch crop, being much hardier than yellow turnips. Several varieties of white turnips, such as Greystone, hardy green round, etc., may be sown, and will give almost equally good results. The crop resembles rape when growing, but instead of being cut with a scythe like rape, "starters" are generally pulled, as small bulbs are formed at the root. The tops and bulbs are fed together to cattle either in the stalls or on grass.

If "starters" are sown in August the crop should be ready for use before the end of April. At that time the plants are commencing to flower, and a heavy bulk of succulent feeding can generally be secured.

The preparation of the land and the manuring are the same for "starters" as for rape. The seed should be sown at the rate of from 5 to 6 lbs. per statute acre. Difficulty is often experienced in broadcasting evenly small quantities of rape or turnip seed. A good plan is to mix the seed with fine earth or sand to increase the bulk.

## RAPE.

Rape is the most suitable of all catch crops for consumption by sheep, and it is for this purpose that it is most commonly grown. Under certain conditions, however, it may be grown with advantage as food for cattle. Rape grows quickly, and under favourable conditions is ready for feeding in from eight to ten weeks after sowing.

There are two varieties :—Giant Rape, also known as Cole, Dutch or Broad-Leaf Rape ; and Dwarf Rape. The first-named variety only is recommended for general purposes.

Rape may be sown after early potatoes for autumn consumption by sheep, or it may be sown on stubble land after an early harvest. Again, it may follow a crop of winter vetches cut in spring, or it may be grown after summer vetches cut during July or August.

Rape might also succeed rye, when it could be followed in turn by winter vetches, or by the ordinary crop of wheat. In some cases rape is sown in July after hay. It is then used in November, and a grain crop is sown in the ordinary course in the following spring.

Rape will grow well on most soils, especially on peaty soils and reclaimed land, but, if sown on sandy land, it requires to be well manured. The crop responds well to a dressing of farmyard manure, and, when possible, dung should be applied if the previous crop has not been so manured. If farmyard manure is not available, 3 or 4 cwt. of superphosphate or basic slag per statute acre should be applied at the time of sowing the seed.

When grown after early potatoes, as soon as the crop is lifted the rape seed is sown broadcast and covered by a light harrowing, no manure being necessary. After a grain crop or after vetches, farmyard manure is ploughed in very lightly, the land harrowed and rolled and the rape seed sown as already described. In such cases the seed should be sown as early as possible in August, and nitrate of soda should be applied at the rate of 1 cwt. per statute acre early in March.

In order to prevent the milk becoming tainted, rape should be fed to cows only immediately after milking.

From 7 to 8 lbs. per statute acre is a suitable quantity of seed.

## ITALIAN RYE-GRASS.

Italian rye-grass is a most valuable crop as green food for milch cows. With proper treatment at least three cuttings can be obtained in one season.

The crop admits of being brought into the rotation under varying conditions. The seed may be sown with oats following a manured crop, or sown separately after early potatoes.

Italian rye-grass responds well to dressings of nitrate of soda or to applications of liquid manure if given under suitable conditions. It is not generally advisable to apply farmyard manure to the crop, as the dung can be used more profitably for tillage crops, and equally good results can be obtained from the rye-grass by the use of artificials alone.

If sown with the oat crop, Italian rye-grass should be well treated from the time the oats are cut if a very early cutting is desired in spring. When the corn is harvested one or more applications of liquid manure may be given; or, failing this, a dressing composed of 3 cwt. superphosphate and 2 cwt. kainit per statute acre may be applied. The land should not be grazed with stock.

About the end of February an application of 1 cwt. nitrate of soda per statute acre may be given. A further dressing of 1 cwt. nitrate of soda may be given about three weeks later. With such treatment the first cutting of grass should be ready by the middle or end of April, when green fodder for cows is particularly valuable. After the first and each subsequent cutting, one or two dressings of liquid manure may be given, or, failing this, nitrate of soda may be applied at the rate of 1 lb. per square perch. This land should be ploughed in autumn and prepared for the succeeding crop of grain or roots.

On land where early potatoes are grown year after year, Italian rye-grass is particularly useful as a catch crop. It should be sown broadcast at the rate of 3 or 4 bushels per statute acre after the potatoes are lifted, and the seed should be covered by a light harrowing. No further treatment is necessary. It is best under these conditions to fold sheep on the land and allow them to eat the crop off bare. In a favourable season the grass is ready for consumption in September. The land is much improved if cake is fed to sheep while they are folded on the rye-grass. After the crop is consumed the land should be manured and ploughed, this work being finished before the end of December so as to allow the final preparation for the following crop of early potatoes to be completed by the end of February.

The rye-grass sown after potatoes might be kept for cutting green in the spring, and in this case the crop should not be grazed in the autumn. The two dressings of nitrate of soda referred to above should be given about the dates mentioned. This treatment will enable heavier cuttings to be obtained than would be possible if the rye-grass had followed a grain crop.

## CABBAGES.

Drumhead cabbages and, in the vicinity of towns, savoy cabbages are largely grown as a catch crop after potatoes.

Thousand-headed kale might, however, be more generally cultivated than at present. This crop is not injured by frost; it will give a heavy yield in March and April, and is very valuable as spring feeding for cows, especially where winter dairying is carried on. The crop follows well after early potatoes or vetches, and allows the ground to be cleared and prepared for sowing the ordinary crop of oats. Farmyard manure should be applied in drills, and transplanting should be done not later than the end of July. To produce suitable plants seed should be sown in beds or in drills at the rate of 4 lb. per acre during March or early in April. The extra plants will be found useful for filling up blanks in turnips, mangels, or potatoes and for planting headlands. The crop should be kept free from weeds, and should receive the necessary cultivation. The plants are usually put in about two and a half feet apart in the drills.

Thousand-headed kale may also be grown with advantage in the same manner as an ordinary root crop. For this purpose the seed should be sown in drills in April or May at the rate of 4 lb. per statute acre, and the plants thinned out later.

The remarks concerning thousand-headed kale apply equally to curly greens. The seed is sown in beds, and the manuring, planting and cultivation are the same for both crops.

## SWEDES.

In the South of Ireland, where early potatoes are lifted in June, swedes are often sown as a second crop, and satisfactory results obtained.

In other districts where the general crop of swedes is sown early and strong plants are available, the potato land is drilled, and planted with swedes. The success of this system, however, depends largely on the prevalence of showery weather at the time of transplanting.

## MANGELS.

Mangels are sometimes planted after early potatoes, in the same way as swedes, and fair crops may be obtained in favourable seasons.

## GENERAL.

The success of autumn-sown catch crops depends mainly upon—

1. Early sowing.—Vetches with rye or wheat, rape, hardy green turnips or starters, and Italian rye-grass should be sown, if possible, during August. This is specially important in the northern and western counties. Rye, when grown alone, should be sown as early as possible in September.

2. Manuring.—Except after potatoes it is of the greatest importance that dung should be applied before the crop is sown.

The application of some quick-acting nitrogenous manure early in spring—about the end of February—produces an earlier and heavier cutting. In this article nitrate of soda is recommended generally for this purpose, but even better results will be obtained from a dressing of liquid manure. This fertiliser can safely be applied to all forage crops which are required for cutting green in spring.

Farmers are strongly recommended to consult the Instructors in Agriculture for their respective counties as to the most suitable catch crops to grow.

## “FINGER-AND-TOE” DISEASE.

If such crops as swedes, turnips, cabbages, and rape are grown too frequently there is a danger of the land becoming infected with “finger-and-toe” disease, and when this happens none of these crops can be successfully raised. To avoid this a dressing of lime should be given occasionally, and the crops grown should be as varied as possible.

*Copies of this article in leaflet form (No. 80 Revised) may be obtained free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped.*

## OFFICIAL DOCUMENTS.

## I.—AGRICULTURE.

## ORDER

OF THE DEPARTMENT OF AGRICULTURE AND TECHNICAL  
INSTRUCTION FOR IRELAND.*(Dated 25th. August, 1915.)*

## BLACK SCAB IN POTATOES (SPECIAL AREA, IRELAND) ORDER, 1915.

The Department of Agriculture and Technical Instruction for Ireland, by virtue and in exercise of the powers vested in them under the Destructive Insects and Pests Acts, 1877 and 1907, do order, and it is hereby ordered, as follows :—

*Restriction of movement of potatoes out of Scheduled Districts.*

1. Excepting potatoes shipped from Annalong, Ballyhalbert, Greencastle, Kilkeel, Kircubbin, Portavogie, Portaferry or Rostrevor, potatoes shall not be moved out of either of the districts described in the First Schedule to this Order (hereinafter referred to as the scheduled districts) otherwise than under and subject to the conditions of a licence authorising such movement.

*Certificates : production of certificates : names and addresses.*

2. (1) Potatoes shall not be loaded on any vessel at, or be moved from, the ports of Annalong, Ballyhalbert, Greencastle, Kilkeel, Kircubbin, Portavogie, Portaferry or Rostrevor unless the person causing, directing, or permitting the potatoes to be so loaded, or the person causing, directing or permitting the potatoes to be so moved shall have obtained a certificate in the prescribed form stating that the potatoes are free from the disease known as Black Scab, Wart, or Warty Disease, Cauliflower Disease, Potato Canker, or Potato Rosette (and caused by the fungus known as *Chrysophlyctis endobiotica* [Schilb] or *Synchytrium endobioticum* [Perc.]).

(2) Any person causing, directing or permitting potatoes to be loaded or moved as aforesaid, shall, on demand of a Justice or of a constable or of an inspector or of any authorised officer, or of the master of any vessel on which potatoes have been or are about to be loaded, produce and show to him the aforesaid certificate and shall allow it to be read and a copy of, or extract from, it to be taken by the person to whom it is produced.

(3) Any person in charge or in possession of potatoes loaded or in the course of being loaded on any vessel at the aforesaid ports in contravention of this Order, or of any potatoes moved in contravention of this Order shall, on demand of a Justice or of a constable or of an inspector or of any authorised officer, give his name and

address and all the information in his possession as to the person causing, directing, or permitting the potatoes to be so loaded or moved.

*Restriction on planting, digging, and moving potatoes within prohibited areas.*

3. Within the areas described in the Second Schedule to this Order (hereinafter referred to as the prohibited areas) potatoes shall not be planted, dug or otherwise raised out of the ground, or moved from any field, plot, pit, shed, outhouse or other place on or used in connection with any farm, garden, cottage plot or agricultural holding otherwise than under and in accordance with the conditions of a licence authorising the planting, digging or raising out of the ground, or movement of the said potatoes.

*Restriction on planting of potatoes within scheduled districts.*

4. Potatoes shall not be planted on any land forming part of any field, plot, or other place on which potatoes have previously been grown, outside the prohibited areas but otherwise within the scheduled districts, unless a period of at least five years shall have elapsed since potatoes were previously planted on the said field, plot or other place, or until a licence authorising the planting of potatoes on the said land has been obtained by the occupier of the said land; in the latter case potatoes shall not be planted except in accordance with the conditions, if any, specified in the said licence.

*Prohibition of use for seed purposes of potatoes grown within prohibited areas or scheduled districts.*

5. (1) Potatoes grown within the prohibited areas shall not be supplied or used for planting.

(2) Potatoes grown outside the prohibited areas but otherwise within the scheduled districts shall not be supplied or used for planting elsewhere than in those districts.

*Disposal of potatoes planted in contravention of the Order.*

6. If an inspector or any authorised officer has reason to believe that potatoes planted on any land have been so planted in contravention of this Order or in contravention of the conditions inserted in a licence thereunder, he may serve a Notice on the occupier of the land requiring him to dig or otherwise raise out of the ground the said potatoes, and to dispose of the same in such manner and within such period of time as may be prescribed in the Notice by the inspector or authorised officer.

*Prohibition of movement of potato stalks, &c., grown within prohibited areas.*

7. Potato stalks and leaves or portions thereof grown within the prohibited areas shall not be moved out of the field, plot, or other place on which they have been grown, but shall be destroyed by burning or shall be ploughed into the land by the occupier of the

said field, plot, or other place within such period as may be notified in writing to the occupier by an inspector or by any authorised officer.

*Destruction of "ground" potatoes.*

8. The occupier of any land within the scheduled districts which is not cropped with potatoes for the time being, but which having been so cropped at a previous period contains a more or less number of potato tubers which were not removed from the ground when the crop was raised, shall prevent the growth of the said tubers by pulling or digging up the potato stalks as they appear above ground.

*Restriction on use of potatoes within prohibited areas.*

9. Within the prohibited areas uncooked potatoes or portions thereof shall not be supplied or used either alone or mixed with other materials as food for stock or poultry, or be spread on the land or used as a manure or put into or upon any manure heap.

*Prohibition of use as manure of certain substances within prohibited areas.*

10. Within the prohibited areas it shall not be lawful to supply or to use as manure, or to spread on the land, or to put into or upon any manure heap, either alone or mixed with other material :—

- (a) any cinders or any ashes ; or
- (b) any contents of ashpits ; or
- (c) any cleanings or any sweepings of potato houses or of potato stores or of potato pits.

*Prohibition of use as manure of certain substances within scheduled districts.*

11. Outside the prohibited areas, but otherwise within the scheduled districts, it shall not be lawful to supply or to use as manure, or to spread on the land, or to put into or upon any manure heap, either alone or mixed with other material, any refuse or any other substance coming or obtained from any premises situated within the prohibited areas, consisting wholly or in part of any of the following :—

- (a) any cinders or any ashes ; or
- (b) any contents of ashpits ; or
- (c) any cleanings or any sweepings of potato houses or of potato stores or of potato pits.

*Production of licences : names and addresses.*

12. (1) Any person in charge or in possession of potatoes which are being moved, supplied, used, planted, dug or otherwise raised out of the ground where, under this Order, a licence is necessary shall, on demand of a Justice or of a constable or of an inspector or of any authorised officer, produce and show him the licence and shall allow it to be read and a copy of, or extract from, it to be taken by the person to whom it is produced.

(2) Any person in charge or possession of potatoes suspected by a Justice or by a constable or by an inspector or by any authorised officer of being or having been moved, supplied, used, planted, dug



or otherwise raised out of the ground, without a licence in contravention of this Order shall, on demand as aforesaid, give his name and address and all the information in his possession as to the persons in whose charge or possession the potatoes have been and as to the place where the potatoes were grown or loaded.

### *Special Licences.*

13. Notwithstanding anything in this Order contained, any potatoes, potato peelings, potato stalks, potato leaves or portions thereof, cinders or ashes, contents of ash pits, or cleanings or sweepings of potato houses or of potato stores or of potato pits, may be moved, supplied, used, or dealt with in any manner specified in any licence granted by an inspector or by any authorised officer.

### *Powers of Entry and Inspection.*

14. Any Justice, constable, inspector or any authorised officer upon production, if so required, of his appointment or authority may, for the purpose of enforcing this Order, or of detecting any violation of the provisions thereof, enter any premises, or any ship, boat, or other vessel or craft, and examine and take samples of any potatoes therein.

### *Licences and Certificates.*

15. (1) Licences and certificates under this Order may be granted by any inspector or by any authorised officer.

(2) Every licence and certificate issued under this Order shall be delivered up to the Department in the manner prescribed on said licence or certificate as soon as the purpose for which it was issued has been carried out or the time for which it is valid has elapsed.

(3) Any erasure or alteration made in a licence or certificate shall render it invalid.

(4) A licence or certificate under this Order obtained by means of any false statement or misrepresentation shall be invalid.

### *Offences and Penalties.*

16. If any person—

(a) moves any potatoes, potato peelings, potato stalks, potato leaves, or portions thereof, or causes, directs or permits the same to be moved, in contravention of this Order, or in contravention of the conditions inserted in any licence thereunder; or

(b) loads any potatoes, potato peelings, potato stalks, potato leaves, or portions thereof, on any ship, boat, or other vessel or craft, or causes, directs, or permits the same to be so loaded, in contravention of this Order or in contravention of the conditions inserted in any licence thereunder; or

(c) plants any potatoes or digs or raises any potatoes out of the ground; or causes, directs or permits the same to be planted, dug, or raised in contravention of this Order, or in contravention of the conditions inserted in any licence thereunder; or

(d) refuses or neglects to comply with any direction contained in a Notice served on him under this Order; or

- (e) refuses or neglects to destroy any potato stalks, potato leaves, or portions thereof, either by burning or by digging or ploughing the same into the land; or causes, directs, or permits the same to remain undestroyed as aforesaid in contravention of this Order; or
  - (f) refuses or neglects to prevent in the manner prescribed in Article 8 of this Order the growth of certain potatoes in contravention of this Order or in contravention of the conditions inserted in any licence thereunder; or
  - (g) uses as food for stock or poultry or as manure, or puts into or upon any manure heap, or spreads on any land any potatoes, potato peelings, potato stalks, potato leaves or portions thereof; or causes, directs, or permits the same to be used as food for stock or poultry, or as manure, or to be put into or upon any manure heap or spread on any land, in contravention of this Order or in contravention of the conditions inserted in any licence thereunder; or
  - (h) supplies or uses as manure, or puts into or upon any manure heap, or spreads on any land, any of the substances mentioned in Articles 10 and 11 of this Order, or causes, directs, or permits the same to be supplied or used as aforesaid in contravention of this Order, or in contravention of the conditions inserted in any licence thereunder; or
  - (i) obtains or attempts to obtain a licence or certificate under this Order by means of any false statement or misrepresentation; or
  - (j) refuses or neglects to produce and show any licence or certificate or refuses to allow it to be read and a copy of or extract from it to be taken as required by this Order when called upon to do so by any of the persons set out in Articles 2 (2) and 12 (1) of this Order; or
  - (k) refuses or neglects to give his true name and address or gives a false name or address to any of the persons set out in Articles 2 (3) and 12 (2) of this Order; or
  - (l) refuses or neglects to give to any of the persons set out in Articles 2 (3) and 12 (2) of this Order or to the Department when required to do so the information required by said Articles; or
  - (m) obstructs or impedes any inspector or any authorised officer in discharge of his duty under this Order; or
  - (n) refuses or neglects to deliver up any licence or certificate in contravention of Article 15 of this Order; or
  - (o) is guilty of any other act or default in contravention of the provisions of this Order;
- he shall be guilty of an offence and shall be liable on conviction to a penalty not exceeding ten pounds for each offence.

#### *Execution of the Order.*

17. For the purposes of this Order a Notice shall be deemed to be served on a person if it is delivered to him personally or left for him at his last known place of abode, or at his office or place of business, or sent through the post in a letter addressed to him at

either of such addresses, and a Notice or other document purporting to be signed by an inspector or any authorised officer shall be *prima facie* evidence that it was signed by such inspector or such authorised officer as the case may be and duly authorised.

*Definitions.*

18. In this Order—

“The Department” means the Department of Agriculture and Technical Instruction for Ireland.

“Inspector” means an Inspector of the Department.

“Authorised Officer” means any person authorised by the Department.

“Premises” means land, or a building or buildings, or land with a building or buildings thereon.

“Occupier” means any person using land for the purpose of or in connection with growing potatoes thereon, whether he has an estate in said lands or not.

“Prescribed” means prescribed by the Department.

*Commencement.*

19. This Order shall come into operation on the Twenty-fifth day of August, Nineteen hundred and Fifteen.

*Short Title.*

20. This Order may be cited as the Black Scab in Potatoes (Special Area, Ireland) Order, 1915.

*Revocation of Previous Order.*

21. The Order described in the Third Schedule to this Order is hereby revoked as from the Twenty-fifth day of August, Nineteen hundred and fifteen; provided that such revocation shall not—

- (i.) affect the previous operation of that Order or anything duly done or suffered under that Order; or
- (ii.) affect any right, privilege, obligation, or liability acquired, accrued, or incurred under that Order; or
- (iii.) affect any penalty incurred in respect of any offence committed against that Order; or
- (iv.) affect any investigation, legal proceeding, or remedy in respect of any such right, privilege, obligation, liability, or penalty as aforesaid;

and any such investigation, legal proceeding, or remedy may be instituted, continued or enforced, and any such penalty may be imposed, as if this Order had not been made.

IN WITNESS whereof the Department of Agriculture and Technical Instruction for Ireland have hereunto set their Official Seal this Twenty-fifth day of August, Nineteen hundred and Fifteen.

H. G. SMITH,

*On behalf of the Secretary.*

[L.S.]

## FIRST SCHEDULE. SCHEDULED DISTRICTS.

### DISTRICT No. 1—

A District comprising :—

The townlands of Ballincurry, Ballindoalty, Ballyedmond, Ballyneddan, Ballinran, Ballintur, Kilfeaghan, Kilfeaghan Upper, and Tammyveagh, all in the barony of Iveagh Upper, Upper Half, in the Administrative County of Down; and the townlands of Aghyoghill, Attical, Aughnahoory, Aughnaloopy, Aughrim, Mourne Mountains West, Lisnacree Upper, Lisnacree, Ballymadeerfy, Glenloughan, Glenloughan Upper, Tullyframe, Maghery, Drummanlane, Ballygowan, Benagh Upper, Benagh Lower, Greencastle, Cranfield, Grange, Lurganconary, Lurganreagh, Drummanmore, Corcreaghan, Ballymagart, Mourne Park or Ballyrogan, Ballymageogh, Mourne Mountains Middle, Drumindoney, Ballyardel, Ballynahatten, Dunnaval, Derryoge, Dunnaman, Drumcro, Leitrim, Leitrim Upper, Ballinran Upper, Ballinran, Kilkeel including Kilkeel town, Magheramurphy, Maghereagh, Ballykeel, Carrigenagh, Carrigenagh Upper, Brackenagh West Upper, Brackenagh West, Brackenagh East Upper, Brackenagh East, Ballymartin, Ballyveagh Beg, Ballyveagh Beg Upper, Ballyveagh More, Ballyveagh More Upper, Moneydorrugh More Upper, Moneydorrugh More including the town of Annalong, Moneydorrugh Beg, Mullartown, Glasdrumman, Ballaghanery, Ballaghanery Upper, Guineways, Guineways Upper, Moyad Upper, Moyad, all in the Barony of Mourne in the Administrative County of Down; and the Rostrevor Quay and the direct road leading thereto from the townland of Ballinran in the Barony of Iveagh Upper, Upper Half, in the Administrative County of Down.

### DISTRICT No. 2—

A District comprising :—

The townlands of Ardgeehan, Ardkeen, Ardminnan, Ardquin, Ballyadam, Ballyblack, Ballybranigan, Ballycam, Ballycran Beg, Ballycran More, Ballyedcock or Carrstown, Ballyesborough, Ballyfinragh, Ballyfounder, Ballyfrench, Ballygalget, Ballygarvigan, Ballygelagh, Ballygraffan, Ballyhalberty, Ballyhenry, Ballyherly, Ballymacnamee, Ballymarter, Ballyminnish, Ballymurphy, Ballynichol, Ballyphilip, Ballyquintin, Ballyridley, Ballyrusley, Ballyspurge, Ballytrustan, Ballywadden, Ballywallon, Ballyward, Ballywhite, Ballywhollart, Ballywierd, Broom Quarter, Castleboy, Cloghy, Corrog, Cookstown, Craigarcddan, Demesne, Derry, Dorey, Drumardan, Drumardan Quarter, Dunevly, Echlinville, Fishquarter, Glastry, Granagh, Gransha, Kearney, Keentagh, Killydressy, Kirkcubbin, Kirkistown, Knockindelder, Loughdoo, Lisbane, Marlfield, Newcastle, Parson Hall, Priest Town, Portavogie, Ratallagh, Rowreagh, Slanes, Tara, Thomastown, Tieveshilly, Tullycarnan, Tullyboard, Tullycross, Tullymally, Tullymacrew, Tullytraman, all in the Barony of Ards Upper in the Administrative County of Down.

## SECOND SCHEDULE.

### PROHIBITED AREAS.

#### 1. A District comprising :—

Such parts of the Administrative County of Down as lie within the following boundary (the roads mentioned as forming the boundary being regarded as outside the prohibited area):—

Commencing at the point (near Mr. O'Hagan's farm) on the coast where the boundary between the Townlands of Ballynahatten and Cranfield in the Barony of Mourne begins, thence by the aforesaid boundary to the point where it meets the main road near Mourne Wood demesne, thence by the direct road passing Mourne Woodgate lodge to Ballyardel crossroads, thence by the direct road *via* Belhill to Newry main road, thence by the direct road to Mr. Doran's shop, thence by the direct road *via* Massfort Chapel to Hilltown Mountain road, thence by the direct road to the point where it meets the townland boundary between Kilkeel and Aughnaloopy townlands, thence by the townland boundary *via* Pookey bridge to the Kilkeel river, thence by the Kilkeel river to the Newcastle road bridge at Riverside, thence by the direct road to Mullagh bridge, thence by the Mullagh river to Brackenagh bridge, thence by the direct road to Ballyveagh Beg main road, thence by Ballyveagh Beg main road to Brackenagh cross road, thence by the direct road over ford and townland boundary to Ballyveagh cross roads (near Ballyveagh school), thence by Longstone road, passing Moneydorrugh school, to Mr. McKibbin's house, thence by Moneydorrugh Beg road (known also as Rocky Hill road), passing Mr. Stewart's shop, to Newcastle road, thence by the direct road to Moneydorrugh Beg Shore road, thence by Moneydorrugh Beg Shore road to the point where it reaches the seashore, thence directly by the seashore to the point on the coast near Mr. O'Hagan's farm where the boundary between Ballynahatten and Cranfield townlands, in the Barony of Mourne, begins.

2. A District comprising :—

Such parts of the Administrative County of Down as lie within the following boundary (the roads mentioned as forming the boundary being regarded as outside the prohibited area) :—

Commencing at the point on the coast in the townland of Benagh Upper, in the Barony of Mourne, where the White Water river enters Millbay, thence by the White Water river to White Water bridge, thence by the direct road (which crosses the road leading from Grange School to Greencastle Post Office), passing Mr. Gordon's farm, to the seashore at Cranfield Bay, thence by the seashore *via* Greencastle Point to the point on the coast in the townland of Benagh Upper, in the Barony of Mourne, where the White Water river enters Millbay.

3. Any farm, garden, cottage plot or agricultural holding (situated wholly or partly within the area described as District No. 2 in the First Schedule to this Order) on any portion of which the disease of potatoes known as Black Scab, Wart or Warty disease, Cauliflower disease, Potato Canker or Potato Rosette (and caused by the fungus known as *Chrysophlyctis endobiotica* [Schilb] or *Synchytrium* [*endobioticum* Perc.]) exists or has at any time existed.

### THIRD SCHEDULE.

### ORDER REVOKED.

The Black Scab in Potatoes (Special Area, Ireland) No. 2 Order, 1914.

## DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

### SCHEME OF AGRICULTURAL EXPERIMENTS.

*[The original Scheme of manurial and variety experiments was first put into operation in 1902. The object of the manurial experiments was to ascertain the most suitable combinations of manures for each of the principal farm crops. These experiments were continued until 1911. The superiority of the results from certain mixtures was so uniform throughout the period during which the scheme had then been in operation that further repetition of the tests was not considered necessary after that year. In 1908 a second series of manurial experiments was introduced with a view to determining, in the case of the manures which had given the best results in previous years, what were the most advantageous proportions in which the several ingredients should be mixed. This series was continued until 1915. The manurial experiments for peat soils and with seaweed, given in the following scheme were introduced in 1912. Slight changes in the variety experiments, have been made from time to time. Details of field experiments are given in Division A of this Scheme.]*

*Experiments in the feeding of Live Stock were commenced in 1911. The scheme then adopted was repeated during the 1912-13 season. An entirely new series was introduced for 1913-14 and continued in 1914-15. Details of the experiments which have been revised for 1915-16 will be found in Division B of this Scheme.]*

Before commencing field experiments and demonstrations each year, each Agricultural Instructor must submit to the County Committee and the Department his plans for the work, showing the number and variety of the experiments and demonstrations which he proposes to conduct and the estimated cost in detail of the seeds, manures, and accessories required.

When his proposals have been approved by the County Committee and the Department, the Instructor should, on behalf of the Committee, order the seeds and manures in the requisite quantities. The Instructor must not, of course, obtain goods for which the Committee are liable for payment without authorisation from the Committee to do so. He should take every precaution to ensure that the seeds and manures are of the kinds specified in the scheme, and that the prices charged are not in excess of current market rates. The merchants' accounts are to be carefully examined by him, and he is required to certify as to their accuracy before they are presented to the County Committee for payment. Returns in connection with

the experiments of each class (manurial, variety, etc.) on the several crops dealt with should be furnished to the Department on the forms supplied for the purpose, immediately after the necessary weighings, etc., have been completed on all the plots of any one class from which reliable results can be obtained. Particulars of all experiments of the same class should be furnished together on *one* appropriate form and the averages, etc., indicated on the form fully worked out.

The dates before which the reports dealing with experiments with the different crops must reach the Department are as follows :—

Meadow Hay	..	..	30th September.
Potatoes	..	..	15th November.
Mangels	..	..	30th November.
Turnips	..	..	15th December.
Grain	..	..	21st December.

The Department should be duly informed of the failure of any experiment.

The Instructor should submit to the County Committee, as soon as possible after the completion of his experimental work each season, a report on the results obtained during the season, so that if the Committee desire to publish the report, they may obtain the approval of the Department and have the report circulated among farmers prior to the commencement of the following season's field operations.

The experiments are intended as object-lessons to farmers in the cultivation, manuring, and seeding of land, and should be labelled so that an ordinary observer may be able easily to ascertain what they are intended to show. One label will suffice for each demonstration plot, but in the case of an experiment which includes several plots, a larger label stating the general character of the experiment should be erected in addition to the smaller labels, giving particulars with respect to each of the plots included in the experiment. The labels should be capable of resisting the weather.

No change must be made in any of the manurial experiments as given below, but the Instructor may include such additional plots as local conditions render advisable. In the variety tests, Instructors are required to include all the varieties specified in each list.

It should be noted that both seeds and manures must not be supplied for the same experiment or demonstration.

Demonstration plots should not exceed one-quarter acre in area.

Instructors with less than two years' experience of itinerant work must not undertake live stock experiments unless they obtain the Department's special approval for doing so.

## A.—SCHEME OF THE FIELD EXPERIMENTS.

### I.—Oat Crop (Variety Test).

Size of plots not less than one-eighth or more than a quarter of a statute acre.

The following varieties to be tested :—

- |                     |                         |
|---------------------|-------------------------|
| 1. Potato.          | 5. Yielder.             |
| 2. Black Tartarian. | 6. Banner.              |
| 3. Abundance.       | 7. Any other varieties. |
| 4. Waverley.        |                         |

### II.—Oat Crop (Residual Value of Artificial Manures).

Size of plots, one-tenth of a statute acre.

The object of this experiment is to obtain accurate data regarding the effects on the oat crop of artificial manures applied to the previous potato crop.

No. of  
Plot

1. Manure applied per statute acre to potatoes :—

15 tons farmyard manure.

2. Manure applied per statute acre to potatoes :—

{ 15 tons farmyard manure.  
4 cwts. Superphosphate.  
1 cwt. Sulphate of Ammonia.  
1 cwt. Muriate of Potash.

The yield of grain and straw of the oat crop to be ascertained.

### III.—Barley Crop (Variety Test).

Size of plots, not less than one-eighth or more than a quarter of a statute acre.

The following varieties to be tested :—

1. Archer.
2. Goldthorpe.
3. Any other varieties.

### IV.—Wheat Crop (Variety Test).

Size of plots, not less than one-eighth or more than a quarter of a statute acre.

The following varieties to be tested :—

1. Queen Wilhelmina.
2. White Stand Up.
3. Squarehead Master.
4. Any other varieties.



### V.—Turnip Crop (Variety Test).

Size of plots, each four drills full length of field.

The following varieties to be tested :—

#### SWEDES.

1. Improved Purple Top.
2. Best of All.
3. Magnum Bonum.
4. Triumph.
5. Shamrock.
6. Incomparable Green Top (Garton).
7. Any other varieties.

#### YELLOW TURNIPS.

8. Centenary.
9. Aberdeen Green Top.
10. Any other varieties.

### VI.—Mangel Crop (Variety Test).

Size of plots, each four drills full length of field.

The following varieties to be tested :—

- |                    |                         |
|--------------------|-------------------------|
| 1. Yellow Globe.   | 4. Long Red.            |
| 2. Prize Winner.   | 5. Any other varieties. |
| 3. Golden Tankard. |                         |

### VII.—Potato Crop (Variety Test).

Size of plots, one-fortieth of a statute acre.

The following varieties to be tested :—

- |                          |                         |
|--------------------------|-------------------------|
| <i>Maincrop.</i>         | 6. Old Champion.        |
| 1. Up-to-Date.           | 7. Arran Chief.         |
| 2. Arran Hope.           | 8. Any other varieties. |
| 3. Summit.               | <i>Mid-Season.</i>      |
| 4. Irish Queen.          | 9. British Queen.       |
| 5. Shamrock.             | 10. Abundance.          |
| 11. Any other varieties. |                         |

### VIII.—Experiment with Potatoes to test the Effects of the Introduction of New Seed from different districts.

Seed for this experiment (except that used in Plot 1) will be supplied by the Department. The seed for all plots is to be of the Up-to-Date variety.

It is hoped to supply seed of uniform quality for plots 2 to 7, inclusive. The farmer's homegrown seed for Plot 1 should be of similar size to that supplied for the other plots, and it should all be treated in the same way as regards sprouting. The seed for be plots is to be planted whole.

### Size of plots, one-fortieth of a statute acre.

No. of Plot		No. of Plot	
1.	Farmer's homegrown seed.	5.	Seed grown in Connaught.
2.	Seed grown in Ulster.	6.	„ „ England.
3.	„ „ Munster.	7.	„ „ Scotland.
4.	„ „ Leinster.		

The Department will supply fresh seed from the same sources each season for two or three years to enable Instructors to repeat the experiment—not necessarily on the same farms.

### IX.—Experiment with Potatoes to test the Effects of Improved Methods of Cultivation.

This experiment is designed to show the combined effect resulting from the sprouting of the seed, the application of artificial manures and the spraying of the crop.

Seed of the same stock is to be planted in both plots in the experiment.

Size of plots, one-twentieth of a statute acre.

Plot 1. The seed for this plot is to be planted whole and to be taken directly from the pit at the time of planting, only 20 tons per statute acre of farmyard manure to be applied and the crop left unsprayed.

Plot 2. Similar seed as for Plot 1, but it must have been previously sprouted in boxes; 6 cwt. per statute acre of the mixture of artificial manures recommended by the Department for potatoes to be applied in addition to 20 tons of farmyard manure per statute acre, and the crop to be sprayed twice.

### X.—Potato Crop (Manurial Test with Seaweed).

This experiment is to be carried out in all seaboard counties where seaweed is used as a manure. In order that tests of this kind may provide information as precise and comprehensive as possible, Instructors are required to submit to the Department small but representative samples of the seaweed applied. The samples should reach the Department in such condition as will render it possible to identify the species of the seaweed.

Size of plots, one-twentieth of a statute acre.

The following kinds and quantities of manures to be used per statute acre :—

No. of Plot.	
1	15 tons farmyard manure.
2	15 tons Seaweed.
3	15 tons Seaweed.
	1 cwt. Sulphate of Ammonia.
	4 cwt. Superphosphate.
	1 cwt. Muriate of Potash.

No. of  
Plot.

- |   |   |                             |
|---|---|-----------------------------|
| 4 | { | 15 tons Seaweed.            |
|   |   | 4 cwt. Superphosphate.      |
|   |   | 1 cwt. Muriate of Potash.   |
| 5 | { | 15 tons Seaweed.            |
|   |   | 1 cwt. Sulphate of Ammonia. |
|   |   | 4 cwt. Superphosphate.      |
| 6 | { | 15 tons Seaweed.            |
|   |   | 4 cwt. Superphosphate.      |

Class of Seaweed used should be noted, and also time and method of application.

### **XI.—Potato Crop (Spraying Test).**

Size of plots, one-tenth of a statute acre.

(120 gallons of mixture to be applied per statute acre at each spraying.)

The following to be compared :—

No. of  
Plot.

1. Unsprayed.
2. Effect of a 1 per cent. lime or Bordeaux mixture, double application.
3. Effect of a 2 per cent. lime or Bordeaux mixture, single application.
4. Effect of a 2 per cent. lime or Bordeaux mixture, double application.
5. Effect of a 1 per cent. soda or Burgundy mixture, double application.
6. Effect of a 2 per cent. soda or Burgundy mixture, single application.
7. Effect of a 2 per cent. soda or Burgundy mixture, double application.

### **XII.—Destruction of Charlock (Preshaugh) and other Weeds (Spraying Test).**

Size of plots, one-tenth of a statute acre.

The following solutions to be tested :—

No. of  
Plot

1. Unsprayed.
2. 50 gallons 3 per cent. Sulphate of Copper.
3. 80 gallons 3 per cent. Sulphate of Copper.

**XIII.—Improvement of Second Class Pasture.***Improvement to be estimated by Observation.*

Size of plots, one-quarter of a statute acre.

The following kinds and quantities of manures to be applied per statute acre :—

No. of  
Plot.

- |   |  |
|---|--|
| 1 | 5 cwt. Basic Slag (high grade).                      |
| 2 | { 5 cwt. Basic Slag (high grade).<br>2 cwt. Kainit.  |
| 3 | 10 cwt. Basic Slag (high grade).                     |
| 4 | { 10 cwt. Basic Slag (high grade).<br>2 cwt. Kainit. |
| 5 | 5 cwt. Potassic Superphosphate.                      |
| 6 | 10 cwt. Potassic Superphosphate.                     |

**XIV.—Influence of Seed Mixtures in forming Pasture.***Land selected to be left in grass for not less than two years.*

Size of plots, not less than one-tenth or more than one-fourth of a statute acre.

The following mixtures to be tested :—

**Plot 1.**

- 1 bushel Italian Rye Grass (22 lb. per bushel).
- $\frac{1}{2}$  bushel Perennial Rye Grass (28 lb. per bushel).
- 4 lb. Red Clover.
- 2 lb. White Clover.

**Plot 2.**

- 1 bushel Perennial Rye Grass (28 lb. per bushel).
- $\frac{1}{2}$  bushel Italian Rye Grass (22 lb. per bushel).
- 4 lb. Red Clover.
- 2 lb. White Clover.

**Plot 3.**

- 18 lb. Perennial Rye Grass.
- 9 lb. Italian Rye Grass.
- 3 lb. Timothy.
- 3 lb. Cocksfoot.
- 4 lb. Broad Red Clover.
- 2 lb. Alsike Clover.
- 1 lb. White Clover.

**Plot 4.**

- 15 lb. Perennial Rye Grass.
- 7 lb. Italian Rye Grass.
- 4 lb. Meadow Fescue.
- 3 lb. Timothy.
- 3 lb. Cocksfoot.
- 4 lb. Broad Red Clover.
- 2 lb. Alsike Clover.
- 2 lb. White Clover.

**Plot 5.**

At the discretion of the Instructors the following mixture (Elliot's) may be tested, but only on poor thin land:—

	Quantity of Seed per acre lb.
Cocksfoot .. .. .	10
Meadow Fescue .. .. .	5
Tall Fescue .. .. .	4
Tall Oat-like Grass .. .. .	3
Hard Fescue .. .. .	1
Rough-stalked Meadow Grass .. .. .	$\frac{1}{2}$
Smooth-stalked Meadow Grass .. .. .	1
Golden Oat Grass .. .. .	$\frac{1}{2}$
Italian Rye Grass .. .. .	3
White Clover .. .. .	2
Alsike Clover .. .. .	1
Late-flowering Red Clover .. .. .	2
Kidney Vetch .. .. .	$2\frac{1}{2}$
Chicory .. .. .	3
Burnet .. .. .	8
Sheep's Parsley .. .. .	1
Yarrow .. .. .	$\frac{1}{2}$
	<hr/>
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**XV.—Liquid Manure Experiments.**

(a) On First Crop Hay or Old Meadow, preferably the former.

Size of plots, one-sixteenth of a statute acre (for small farms, each plot may be one-fortieth of a statute acre).

The following kinds and quantities of manures to be applied per statute acre:—

- |                         |  |                         |                                    |                       |                                 |               |
|-------------------------|--|-------------------------|------------------------------------|-----------------------|---------------------------------|---------------|
| No. of<br>Plot.         |  |                         |                                    |                       |                                 |               |
| 1.                      | No manure.   |                         |                                    |                       |                                 |               |
| 2.                      | 16 tons farmyard manure, applied before 15th February.   |                         |                                    |                       |                                 |               |
| 3.                      | 16 tons liquid manure, applied one-half in February and one-half in April.   |                         |                                    |                       |                                 |               |
| 4.                      | <table border="0"> <tr> <td>1 cwt. Nitrate of Soda,</td> <td>applied during last half of March.</td> </tr> <tr> <td>2 cwt. Superphosphate</td> <td rowspan="2">} applied before 15th February.</td> </tr> <tr> <td>2 cwt. Kainit</td> </tr> </table> | 1 cwt. Nitrate of Soda, | applied during last half of March. | 2 cwt. Superphosphate | } applied before 15th February. | 2 cwt. Kainit |
| 1 cwt. Nitrate of Soda, | applied during last half of March.   |                         |                                    |                       |                                 |               |
| 2 cwt. Superphosphate   | } applied before 15th February.  |                         |                                    |                       |                                 |               |
| 2 cwt. Kainit           |  |                         |                                    |                       |                                 |               |

## (b) On Cabbages.

No. of  
Plot.

1. No manure—size of plot, 1 square perch.
2. 20 tons farmyard manure—size of plot, 4 square perches.
3. 20 tons liquid manure—size of plot, 4 square perches.

**EXPERIMENTS ON PEAT SOILS.**

The following experiments are to be conducted on peat soils only. In each case a sample of the soil is to be taken before the plots are laid down and submitted for analysis to permit of the percentage of lime and organic matter being determined.

**XVI.—OATS (Peat Soils).**

Size of Plots, one-tenth of a statute acre.

The following kinds and quantities of manures to be used per statute acre :—

No. of  
Plot.

- 1 No Manure.
- 2 3 cwt. Superphosphate.
- 3 { 3 cwt. Superphosphate.  
2 cwt. Kainit.
- 4 { 1 cwt. Sulphate of Ammonia.  
3 cwt. Superphosphate.  
2 cwt. Kainit.
- 5 { 1 cwt. Nitrate of Soda.  
3 cwt. Superphosphate.  
2 cwt. Kainit.

**XVII.—TURNIPS (Peat Soils).**

Size of plots, one-twentieth of a statute acre.

The following kinds and quantities of manures to be used per statute acre :—

No. of  
Plot.

- 1 15 tons Farmyard Manure.
- 2 { 15 tons Farmyard Manure.  
4 cwt. Superphosphate.
- 3 { 15 tons Farmyard Manure.  
4 cwt. Slag.
- 4 { 15 tons Farmyard Manure.  
4 cwt. Superphosphate.  
2 cwt. Kainit.
- 5 { 15 tons Farmyard Manure.  
4 cwt. Slag.  
2 cwt. Kainit.

No. of  
Plot

- |   |   |                             |
|---|---|-----------------------------|
| 6 | { | 4 cwt. Superphosphate.      |
|   |   | 1 cwt. Sulphate of Ammonia. |
|   |   | 3 cwt. Kainit.              |
| 7 | { | 4 cwt. Slag.                |
|   |   | 1 cwt. Sulphate of Ammonia. |
|   |   | 3 cwt. Kainit.              |

**XVIII.—MANGELS** (Peat Soils).

Size of plots, one-twentieth of a statute acre.

The following kinds and quantities of manures to be used per statute acre :—

No. of  
Plot

- |   |   |                             |
|---|---|-----------------------------|
| 1 |   | 20 tons Farmyard Manure.    |
| 2 | { | 20 tons Farmyard Manure.    |
|   |   | 4 cwt. Superphosphate.      |
|   |   | 4 cwt. Kainit.              |
| 3 | { | 20 tons Farmyard Manure.    |
|   |   | 4 cwt. Superphosphate.      |
|   |   | 1 cwt. Sulphate of Ammonia. |
|   |   | 4 cwt. Kainit.              |
| 4 | { | 20 tons Farmyard Manure.    |
|   |   | 4 cwt. Superphosphate.      |
|   |   | 2 cwt. Sulphate of Ammonia. |
|   |   | 4 cwt. Kainit.              |
| 5 | { | 20 tons Farmyard Manure.    |
|   |   | 4 cwt. Superphosphate.      |
|   |   | 2 cwt. Sulphate of Ammonia. |
|   |   | 4 cwt. Salt.                |
| 6 | { | 4 cwt. Superphosphate.      |
|   |   | 2 cwt. Nitrate of Soda.     |
|   |   | 4 cwt. Kainit.              |
| 7 | { | 4 cwt. Superphosphate.      |
|   |   | 2 cwt. Nitrate of Soda.     |
|   |   | 4 cwt. Salt.                |
| 8 | { | 4 cwt. Superphosphate.      |
|   |   | 2 cwt. Sulphate of Ammonia. |
|   |   | 4 cwt. Salt.                |

All manures to be applied before seed is sown.

**XIX.—POTATOES** (Peat Soils).

Size of plots, one-twentieth of a statute acre.

The following kinds and quantities of manures to be used per statute acre :—

No. of  
Plot

- |   |  |                          |
|---|--|--------------------------|
| 1 |  | 15 tons Farmyard Manure. |
|---|--|--------------------------|

No. of  
Plot

- |   |  |
|---|--|
|   | 15 tons Farmyard Manure.                   |
| 2 | { 1 cwt. Sulphate of Ammonia.              |
|   | { 4 cwt. Superphosphate.                   |
|   | { 1 cwt. Muriate of Potash.                |
| 3 | { 15 tons Farmyard Manure.                 |
|   | { $\frac{1}{2}$ cwt. Sulphate of Ammonia.  |
|   | { 4 cwt. Superphosphate.                   |
|   | { 1 cwt. Muriate of Potash.                |
| 4 | { 15 tons Farmyard Manure.                 |
|   | { 4 cwt. Superphosphate.                   |
|   | { 1 cwt. Muriate of Potash.                |
| 5 | { $1\frac{1}{2}$ cwt. Sulphate of Ammonia. |
|   | { 6 cwt. Basic Slag.                       |
|   | { $1\frac{1}{2}$ cwt. Muriate of Potash.   |
| 6 | { $1\frac{1}{2}$ cwt. Nitrate of Soda.     |
|   | { 6 cwt. Basic Slag.                       |
|   | { $1\frac{1}{2}$ cwt. Muriate of Potash.   |
| 7 | { $1\frac{1}{2}$ cwt. Nitrate of Soda.     |
|   | { 6 cwt. Superphosphate.                   |
|   | { $1\frac{1}{2}$ cwt. Muriate of Potash.   |
| 8 | { $1\frac{1}{2}$ cwt. Sulphate of Ammonia. |
|   | { 6 cwt. Superphosphate.                   |
|   | { $1\frac{1}{2}$ cwt. Muriate of Potash.   |

**XX.—MEADOW HAY EXPERIMENT** (Peat Soils)

Size of plots, one-twentieth of a statute acre.

The following kinds and quantities of manures to be used per statute acre :—

No. of  
Plot

- |   |                                       |
|---|---------------------------------------|
| 1 | No Manure.                            |
| 2 | { 2 cwt. Basic Slag.                  |
|   | { 2 cwt. Kainit.                      |
| 3 | { $\frac{1}{2}$ cwt. Nitrate of Soda. |
|   | { 2 cwt. Basic Slag.                  |
|   | { 2 cwt. Kainit.                      |
| 4 | { 1 cwt. Nitrate of Soda.             |
|   | { 2 cwt. Basic Slag.                  |
|   | { 2 cwt. Kainit.                      |
| 5 | { 1 cwt. Nitrate of Soda.             |
|   | { 2 cwt. Superphosphate.              |
|   | { 2 cwt. Kainit.                      |

The Basic Slag to be high grade (34 per cent. citric soluble phosphates) and the Superphosphate to contain 35 per cent. soluble phosphates.



## B.—SCHEME OF EXPERIMENTS IN THE FEEDING OF LIVE STOCK.

In carrying out experiments with Live Stock many unexpected difficulties will be met with by Instructors. They are, accordingly, advised to undertake only a few experiments of this nature until they have gained experience of the work.

### *Selection of Farm.*

In selecting farmers with whom to locate experiments in the feeding of Live Stock only those should be considered who have been in the habit of feeding pigs, in the case of experiments with pigs, and cattle in the case of experiments with cattle. Experiments should be undertaken only where full facilities for weighing the animals exist on the farm or in its neighbourhood.

### *Marking.*

All the animals in the experiments should be properly marked for identification, and it is suggested that this could best be done by ear marks, i.e., by cutting notches out. A simple and cheap instrument would then suffice for marking all kinds of stock.

### *Records.*

The herd or other person who is responsible for attending to the feeding operations should keep notes of matters affecting the progress of the experiment, e.g., periods when animals did not fully consume their rations, etc.

### *Valuing.*

Notes should be made by the Instructor of the appearance and value of the animals in the different lots at the beginning and end of the experiment.

### *Excluding Animals from the Experiment.*

If for any reason such as sickness, accident or death any animal is removed from either lot in an experiment, a corresponding animal should be removed from the remaining lot. Particulars as to the foods given to the excluded animals before being removed should be omitted from the returns given in the general report on the results of the experiment.

### *Weighing of Animals.*

The animals are to be weighed at the beginning and at the end of every experiment. It is most important that the weighings should in each case be made under similar conditions, i.e., if at the beginning of the experiment the animals are weighed in the morning after feeding they should be weighed at the same time and under the same conditions at the end of the experiment.

In the case of Experiment IV., Fattening of Cattle in Stalls, the animals should not be weighed immediately they are tied up off the grass. Before the commencement of the experiment both lots of cattle should be fed alike for at least one week after they are tied up, and they should be weighed at the end of that period.

With regard to pigs, no difficulty will be experienced in weighing the animals at the beginning of the experiment. Where, however, it is not possible to obtain the live weight of the different pigs, at the end of the experiment these should be calculated, allowing 25 per cent. for loss in killing, and the individual weights so arrived at should be included in the figures submitted to the Department.

### *Subsidy.*

To compensate farmers for the trouble involved in carrying out experiments, a subsidy may be given, subject to the concurrence of the County Committee, calculated on the basis of a certain sum in respect of each animal fed. The maximum amount which may be granted in the case of each class of experiment is given below, but Instructors will, no doubt, be able to arrange in many cases for the carrying out of the experiments at a cost much below the maximum allowable. In addition, a small sum may be given as a gratuity to the farm-hand who is in charge of the immediate work of the experiment. The Instructor should impress on the experimenters that payment of the subsidy will depend on his instructions being satisfactorily carried out. Before any experiment is begun, the Instructor should, of course, obtain the County Committee's and the Department's approval of his proposals for same, which should be submitted in detail.

Further particulars in regard to each class of experiment are given hereunder:—

#### **I.—Experiment on the Feeding of Pigs.**

*Object.*—To compare the value of boiled swedes with boiled potatoes when fed in conjunction with maize meal and pollard.

Lot 1. Boiled potatoes, 2 parts; meal mixture, 1 part.

Lot 2. Boiled swedes, 4 parts; meal mixture, 1 part.

The same mixture of meals is to be fed to both lots. At the commencement of the experiment this is to consist of equal parts of maize meal and pollard. During the closing stages of the experiment the proportion of maize meal should be increased.

It is of the utmost importance that the proportion of potatoes and of swedes to the meal mixture should be uniform in every case. To Lot 1 potatoes *must* be fed in the proportion of

2 parts of potatoes to 1 part of meal mixture, and to Lot 2 the swedes *must* be given at the rate of 4 parts of swedes to 1 part of meal mixture.

Separated milk or buttermilk may be fed provided the daily allowance to each lot is the same.

Cooked or raw meals may be used as is found most convenient.

Each lot may be given as much food as the pigs will eat, but the proportion of potatoes or swedes to the meal mixture specified above must on no account be altered, nor are any other foods to be included in the rations.

If both lots are not finished at the same time, all the pigs in one lot may be killed, and those in the other lot kept over until they are approximately of the same average weight as those previously disposed of. The experiment, however, is to be continued until the second lot is sold, and the quantity of food consumed is to be recorded.

Not less than three animals are to be included in each lot. The maximum number of animals in each lot must depend on the funds at the disposal of the Instructor. Pigs should not be less than ten weeks or more than fourteen weeks old at the commencement of the experiment. If possible, pigs between the ages of twelve and fourteen weeks should be selected.

#### *Subsidy for Experiment.*

The maximum subsidy payable is 10s. per pig (in addition to the allowance for the farm hand, which must not exceed 10s. for an entire experiment). The total grant in respect of each experiment must not exceed £5 10s.

## CATTLE.

### II.—Experiment on the Feeding of Calves.

*Object.*—To test the Calf meal recommended by the Department in Leaflet No. 54 against crushed Oats.

Lot 1. Department's Calf meal, viz. :—

2 parts by weight of Oatmeal.

2     "     "     Maize meal.

1     "     "     pure ground Flax seed.

Lot 2. Crushed Oats.

For Lot 1 the calf meal is to be prepared in the usual way and fed along with separated milk.

The same quantity of separated milk is to be given alone to Lot 2, which are to receive, in addition, exactly the same weight of crushed oats as of calf meal fed to Lot 1. The crushed oats are to be fed dry.

Hay may be given to both lots, but linseed cake must not be allowed.

Calves should not be less than four weeks or more than eight weeks old at the commencement of an experiment. The average age of both lots of calves should be as nearly uniform as possible. The minimum number of calves in each lot is to be three. The maximum number must depend on the funds at the Instructor's disposal. The period of experimental feeding should be sixteen weeks.

### *Subsidy for Experiment.*

The maximum subsidy payable is 10s. per calf (in addition to the allowance for the farm hand, which must not exceed 10s. for an entire experiment). The total grant in respect of each experiment must not exceed £5 10s.

### **III.—Experiment on the Fattening of Cattle on Grass.**

*Object.*—To ascertain whether it is profitable to feed cake and meal to two or three-year-old store cattle on grass, when the pasture is not of first rate quality and when the cattle are intended to be sold fat before autumn.

Lot 1. Cake and meal; mixture composed of:—

2 parts undecorticated cotton cake.

1 part maize meal.

Lot 2. No cake and meal.

The quantity of the mixtures to be fed to Lot 1 is to commence at 3 lb. per head daily and to increase to 5 lb. per head daily.

The experiment should begin in May and continue for not less than twelve weeks.

The lots are to be fed in two fields and interchanged fortnightly or weekly.

The minimum number of cattle in each lot is to be four. The maximum number must depend on the funds at the Instructor's disposal.

At the end of twelve weeks, or later, when the experiment is concluded, the cattle in Lot 1 will likely be fat and ready for sale, while the cattle in Lot 2 will not be so forward in condition. At the close of the experiment, therefore, it will be necessary to have both lots of cattle valued as well as weighed. If one or both lots are sold the actual prices realised should be given.

### *Subsidy for Experiment.*

The maximum subsidy payable is 10s. per head (in addition to the allowance for the farm hand, which must not exceed 10s. for an entire experiment). The total grant in respect of each experiment must not exceed £6 10s.

#### IV.—Experiment on the Fattening of Cattle in Stalls.

*Object.*—To compare the results obtained from the use of an expensive mixture of cake and meal with those obtained from the use of a mixture considerably cheaper.

Lot 1. Expensive mixture, viz. :—

- 1 part linseed cake.
- 1 part decorticated cotton cake.
- 2 parts maize meal.

Lot. 2. Cheap mixture, viz. :—

- 2 parts undecorticated cotton cake.
- 2 parts crushed oats.
- 1 part dried brewers' grains.
- 1 part red bran.

Each lot is to be given equal quantities of cake and meal mixture, roots and fodder. No other foods than those specified are to be allowed.

The minimum number of cattle in each lot is to be four. The maximum number must depend on the funds at the Instructor's disposal. The period during which the experimental feeding is to continue must not be less than ten weeks.

#### *Subsidy for Experiment.*

The maximum subsidy payable is £1 per head (in addition to the allowance for the farm hand, which must not exceed 10s. for an entire experiment). The total grant in respect of each experiment must not exceed £10 10s.

**Department of Agriculture and Technical Instruction  
for Ireland.**

### **CATCH CROPS.**

#### **SPRING FEEDING FOR STOCK.**

The attention of farmers is directed to the certainty of feeding stuffs being scarce and dear next spring. It is to be borne in mind that, apart from the present situation, the hay crop is light. Moreover, much of the grain which in ordinary circumstances would be fed to stock may be better utilised as food for human consumption, and particularly for seed, of which more than the usual quantity may be required.

A great deal can be done to provide food for stock next spring by sowing now the following winter crops:—

- (1) Giant Essex rye;
- (2) Winter vetches, with either rye, or winter wheat;
- (3) Hardy green turnips—also known as Starters.
- (4) Giant rape;
- (5) Italian ryegrass.

These may be sown after the following crops:—

- (1) Early or mid-season potatoes;
- (2) Oats, wheat, or barley;
- (3) Flax; or
- (4) Grass.

**GIANT ESSEX RYE** may be sown after all the crops mentioned. The land will require to be ploughed; the seed may then be sown and harrowed in the same way as for oats. Seeding should be at the rate of 16 stones per statute acre.

**WINTER VETCHES**, with rye or wheat, may follow all the crops mentioned. The land should be ploughed and the vetches sown broadcast as in the case of an ordinary grain crop. The rate of seeding should be about 8 stones of vetches and 4 stones of grain per statute acre.

**HARDY GREEN TURNIPS OR STARTERS** may be sown as described for rape, and at the rate of 5 to 6 lbs. per statute acre.

**GIANT RAPE** may be sown after all the crops mentioned; after potatoes all that is required is to sow the seed and harrow the land; after other crops the land will require to be ploughed and harrowed before the seed is sown, and then the seed covered by harrowing again. The seed should be sown broadcast at the rate of 7 or 8 lbs. per statute acre.

**ITALIAN RYEGRASS** will give the best results when sown after potatoes. The seed may be sown broadcast, at the rate of at least 3 bushels per statute acre, and covered by harrowing lightly.

**AUTUMN MANURING.**—After potatoes no manure need be applied. After oats, barley, flax or grass, if possible a dressing of dung should be ploughed under. If dung is not available, artificial manure should be applied after the land has been ploughed and cleaned, and before sowing the seed. A suitable manuring for all these crops is 4 or 5 cwt. superphosphate or basic slag per statute acre.

**SPRING MANURING.**—To ensure a successful and early crop it is essential that a dressing of 1 cwt. of nitrate of soda per statute acre should be applied in February or early in March in every case. Even better results would be secured from the use of liquid manure.

To sum up:—(1) Sow during August, or at the very latest early in September. (2) If possible, apply farmyard manure

in all cases except after potatoes. (3) Apply nitrate of soda or liquid manure in February or early in March.\* (4) Secure from the Department of Agriculture a copy of leaflet No. 80 which gives fuller particulars regarding catch crops.

## **SECRETS OF SUCCESS:—**

### **SOW EARLY.**

### **MANURE WELL.**

*NOTE.—It is hardly necessary to state that the conditions vary considerably throughout this country, and that all of the crops herein referred to are not equally suitable for sowing in every county. For particulars regarding the crops suitable for their districts farmers should, therefore, apply to the respective Agricultural Instructors.*

*Swedes should not be sown after rape or hardy green turnips, as they would then be liable to suffer injury from Club Root or Finger and Toe disease.*

*August, 1915.*

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*Under revision.*

**Scheme No. 20.**

## **DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.**

### **SCHEME FOR ENCOURAGING IMPROVEMENT IN THE DAIRY CATTLE OF IRELAND.**

*(The provisions of this Scheme will apply to all cow-testing associations recognised as from the 1st January, 1916.)*

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Dairying, as well as the raising of store cattle, is one of the principal branches of agriculture in this country. It is, accordingly, of importance that the milking properties of Irish cattle should be preserved and improved. In dairy herds the yield and quality of milk given by each cow largely determine whether the animal realises a profit or entails a loss to the owner; consequently, it is essential that farmers should know exactly the quantity and quality of milk which each cow yields per annum. At the same time, as young cattle are a considerable source of revenue, it is desirable that the good milking cow

should be of the type likely to produce a calf which will be of value for both beef and milk. With this object the Department, since 1909, have been encouraging the formation of Cow-Testing Associations.

### **COW-TESTING ASSOCIATIONS.**

All owners of dairy cows are strongly advised to join cow-testing associations, or, if there is no association in their districts, to help where practicable to form such an association. Cow-testing associations enable their members not only to ascertain the quantity but also the quality of the milk yielded by each of their cows, and thus make it possible to determine which cows are worth retaining in a herd and which should be disposed of.

These associations are solely responsible for the correctness of the records kept by their members. In this connection it should be borne in mind that the value of a herd with records or of a young bull from a registered cow will depend mainly on the degree of confidence which other farmers place in the breeder's figures. This fact should induce farmers to bestow special care on the keeping of their milk records.

1. The Department are prepared to consider applications for the attendance of a lecturer at meetings of farmers and others interested in dairying, to explain the objects and advantages of cow-testing associations. Applications will be dealt with in the order in which they are received. It is desirable that associations which are to come into operation in the beginning of any year should be formed as soon as possible after 1st November preceding.

2. A cow-testing association desiring to be recognised for the ensuing year under this Scheme must apply to the Department on the prescribed form (A 396) before the 1st January, and must undertake to comply with the regulations of one of the following classes.

#### *Associations—Class A.*

3. A cow-testing association recognised in Class A will be required to comply with the following conditions :—

(a) To admit to membership all dairy farmers (cow owners) in the district served by the association. An association may, however, refuse to admit any person to membership, provided the association satisfies the Department as to the reason for such exclusion.

(b) To secure an entry of as many herds of milking cows as possible, each member being required to enter and furnish on the prescribed form a list of all his cows, and to pay to the president a fee of 1s. (one shilling) per cow as a contribution towards the remuneration of the supervisor. No association will be recognised in this class unless milk records for at least



100 cows are kept throughout the entire milking period by members of the association.

(c) To secure that the members shall have the milk of each cow weighed on every seventh day (the exact day of the week for each member being fixed by the association). The morning and evening milk shall be weighed and recorded separately on the byre record (Form A. 291) which will be provided by the Department.

(d) To arrange that, after every weighing, a sample of each cow's milk shall be taken and preserved until the end of the month, and that the composite sample for the month shall be tested for butter-fat.

(e) To appoint as president one of the members who shall also act as treasurer and be responsible for the funds and accounts of the association.

(f) To appoint a competent supervisor whose duties shall be (i) to keep a register of the members of the association and their cows; (ii) to ensure that the weekly records are properly kept, and to transfer them each month from the byre records to the monthly statements (Form A. 288) provided by the Department; (iii) to carry out regularly the monthly butter-fat tests; (iv) to record in the monthly statements the results of these tests, the calculated number of pounds of butter-fat contained in the milk and the value of the milk; (v) to investigate and check all cases of abnormal weights and tests; (vi) to certify all particulars in respect of any cows submitted by members of the association for entry in the Department's Register; (vii) to prepare an annual statement of the work of the association on the prescribed form and to send a copy of the statement to the Department; and (viii) to furnish the Department with such particulars of the work of the association as may be required.

(g) To provide all apparatus, chemicals, etc., necessary for testing the samples of milk.

(h) To permit the Department at any time to inspect the byre records, monthly statements, register of members, etc., as well as the milking of the cows and the testing of the milk samples.

(j) To obtain the Department's approval of the persons appointed as president and supervisor, and to notify immediately to the Department any changes which may occur in these offices or in the membership of the association.

(k) To arrange for general meetings of the members of the association at least once every three months.

(l) To assume sole responsibility for the remuneration of the supervisor and for the payment of all the expenses incurred by the association.

4. When the Department are satisfied that a cow-testing association has been formed, and that suitable arrangements

have been made to comply with the foregoing requirements, they will be prepared (a) to supply the association with the necessary forms; (b) for one year to contribute to the association at the rate of two shillings per cow towards the cost of employing a supervisor. The subsidy referred to at (b) will not be payable until the Department are satisfied that all requirements have been complied with, and no contribution will be made in respect of any cow for which reliable records have not been kept throughout the entire milking period.

5. Application for payment of the Department's subsidy must be made on the prescribed form and be accompanied by a solemn declaration of the president and the supervisor that the particulars furnished are correct, and that the conditions of the scheme have been fully complied with.

#### *Associations—Class B.*

6. A cow-testing association in which the number of cows and other circumstances warrant the employment of a whole-time supervisor, may be recognised in Class B, and will be required to comply with the following conditions:—

(a) To admit to membership all dairy farmers (cow owners) in the district served by the association, provided that the total number of members shall not exceed twenty-five. An association may, however, refuse to admit any person to membership, provided the association satisfies the Department as to the reason for such exclusion.

(b) To require each member to enter and furnish on the prescribed form a list of all his cows, and to pay to the president an entry fee of 1s. (one shilling) per cow as a contribution towards the remuneration of the supervisor. No association will be recognised in this class unless milk records for at least 200 cows are kept throughout the entire milking period by members of the association.

(c) To secure that the members shall have the milk of each cow weighed on every seventh day (the exact day of the week for each member being fixed by the association). The morning and evening milk shall be weighed and recorded separately on the byre record (Form A. 291) which will be provided by the Department.

(d) To appoint as president one of the members, who shall also act as treasurer, and be responsible for the funds and accounts of the association.

(e) To appoint a competent supervisor whose duties shall be (i) to keep a register of the members of the association and their cows; (ii) to ensure that the weekly records are properly kept, and to transfer them each month from the byre records to the monthly statements (Form A. 288) provided by the Department; (iii) to visit the farm of each member at least once a month, to see each cow being milked (morning and evening),

to check the weighing and recording of the milk, to take a composite sample of the morning and evening milk of each cow and test the sample for butter-fat ; (iv) to record in the monthly statements the results of these tests, the calculated number of pounds of butter-fat contained in the milk and the value of the milk ; (v) to investigate and check all cases of abnormal weights and tests ; (vi) to certify all particulars in respect of any cows submitted by members of the association for entry in the Department's Register ; (vii) to prepare an annual statement of the work of the association on the prescribed form and to send a copy of the statement to the Department ; and (viii) to furnish the Department with any particulars they may require with regard to the work of the association.

(f) To provide all apparatus, chemicals, etc., necessary for testing the samples of milk.

(g) To permit the Department at any time to inspect the byre records, monthly statements, list of members, etc., as well as the milking of the cows and the testing of the milk samples.

(h) To obtain the Department's approval of the persons appointed as president and supervisor, and to notify to the Department any changes which may occur in these offices or in the membership of the association.

(j) To arrange for general meetings of the members of the association at least once every three months.

(k) To assume sole responsibility for the remuneration of the supervisor and for the payment of all the expenses of the association.

7. When the Department are satisfied that a cow-testing association has been formed, and that suitable arrangements have been made to comply with the foregoing requirements, they will be prepared (a) to supply the society with the necessary forms, and (b) for one year to refund to the association two-thirds of the amount of the remuneration paid to the supervisor, provided that the Department's contribution shall not be at a rate in excess of two shillings for each cow tested throughout the entire milking period. The subsidy referred to at (b) will not be payable until the Department are satisfied that all requirements have been complied with, and no contribution will be made in respect of any cow for which reliable records have not been kept throughout the entire milking period.

8. Application for payment of the Department's subsidy must be made on the prescribed form, and must be accompanied by a solemn declaration of the president and the supervisor that the particulars furnished are correct, and that the conditions of the Scheme have been fully complied with.

#### *Registration of Cows.*

9. The Department will keep a Register of dairy cattle in which cows and their progeny may be entered subject to the

provisions of this scheme. The inspection of cows with a view to entry on the Register will be carried out by the Department.

10. The Department, on receiving payment of a fee of 2s. 6d. for each cow, will be prepared to inspect at such centres as may be determined by them all cows of the Shorthorn type which have given, during the milking period covered by the records kept by a recognised cow-testing association, a yield of not less than 210 lb. of butter-fat, provided that the calculated average percentage of butter-fat in the milk does not fall below 3 and the calculated yield of milk below 6,000 lb. The Department will accept for entry in the Register all such animals which as a result of inspection they consider to be of good conformation and well-defined type. The fees will be refunded in respect of cows which are rejected.

Applications for the inspection of cows should be made to the Department on the prescribed form (A. 416) not later than 12th December, and should be accompanied by a certified record of the milk yield of each cow for a complete milking period (See clause 14.)

11. The owner of each registered cow will be required to comply with the following conditions:—

(a) To have the animal served by a registered dairy bull or by a pure-bred Shorthorn bull, which has been passed by the Department as up to premium standard ;

(b) To furnish to the Department on the prescribed form (A. 66) within seven days from the date of birth, particulars regarding sex, colour, markings, etc., of each calf produced by a registered cow, and such particulars of the sire and dam as the Department may require ; and

(c) To keep on the prescribed form (A. 79) a record of the breeding, date of birth, etc., of progeny, for the purposes of future registration. This record must be open to inspection at any time by the Department.

12. When a registered cow or her calf has been disposed of, the Department must be notified of the fact within fourteen days of the disposal of the animal, and at the same time advised of the name and address of the new owner.

The death of a registered cow or of a calf the produce of registered cow, must also be notified to the Department within fourteen days of the death of the animal.

A person failing to observe this regulation will render himself liable to be debarred from participation in this Scheme, and all animals entered in his name may be removed from the Register.

13. In cases where the conditions of clauses 11 and 12 have been fully complied with, male progeny will be eligible for inspection with a view to provisional selection for premiums under the Department's Cattle Breeding Scheme, within the

limits of age specified therein, and, if so selected, will be entered in the Register as "Registered Dairy Bulls."

Owners of male progeny eligible for inspection should apply on the prescribed form in the month of December for a certificate of eligibility, and for particulars of the show or centre at which the animal should be exhibited for inspection.

*General.*

14. For the purposes of this scheme the term "milking period" shall mean the period during which a cow continues to yield milk after calving. Provided that if such period exceeds 45 weeks the first 45 weeks after calving shall be regarded as the cow's milking period.

15. The Department reserve the right, without assigning any reason for their action, (a) to remove the name of any animal from their Register, and (b) to refuse to inspect or register any cow or the progeny of any registered cow.

16. The Department also reserve the right to modify or withdraw this scheme in whole or in part at any time.

17. In all cases of dispute in matters connected with this scheme the decision of the Department shall be final.

*September, 1915.*

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DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET,

DUBLIN,

*October, 1915.*

A 18777-15.

GENTLEMEN,

I have to inform you that at a meeting of the Irish Seed Cleaners, held in Belfast on 24th September, 1915, for the purpose of considering proposals for further raising the standard of quality of the agricultural seeds sold in Ireland, at which the Vice-President of the Department presided, the following resolution was unanimously adopted by the firms represented at the meeting:—

"Resolution—That we, seed cleaners and merchants in Ireland, agree, as testified by our signatures hereto, not to sell for use as agricultural seeds in Ireland any white hay, brown hay, cleanings, blowings, holcus or articles of similar description) or perennial ryegrass under 24 lb. weight per bushel, or Italian ryegrass under 18 lb. weight per bushel."

All the principal seed cleaning firms from whom the great bulk of the ryegrass seed sold in Ireland is procured, directly or indirectly, by Irish wholesale merchants and retailers, have agreed to the terms of the resolution.

By agreement in the year 1913 the seed cleaners discontinued the sale for use as agricultural seeds of the articles referred to under such names as white and brown hay, blowings and cleanings, and of perennial ryegrass seed under 20 lb. per bushel weight, and Italian ryegrass seed under 16 lb. per bushel weight. This agreement adopted and loyally adhered to by the Irish Seed Trade as a whole has had very beneficial results.

The tests of samples since taken under the Weeds and Agricultural Seeds Act have shown, however, that the minimum weights fixed for ryegrass seed were too low. *It will be observed that the seed cleaners have now agreed to raise the minimum weights of the seed sold by them in Ireland to 24 lb. per bushel for perennial and 18 lb. for Italian ryegrass. The Department will accordingly expect that in future no wholesale firm or retailer will stock any perennial or Italian ryegrass seed below these minimum weights.*

It must not be understood from the foregoing that the Department acquiesce in the sale of any perennial or Italian ryegrass seed which complies with the standard now fixed as regards bushel weights, without regard to its purity or germination. The percentages or purity and germination must continue to be a criterion by which the quality of the seed is judged. Wholesale merchants and retailers should accordingly see that the seed stocked by them not only conforms to the standard in respect of bushel weight, but is also satisfactory in purity and germination.

In many cases traders on whose premises samples of inferior seed have been taken under the Weeds and Agricultural Seeds Act have pleaded in excuse that they were ignorant of the inferior quality of the seed. In this connection I have to point out that special facilities are provided by the Department enabling Irish merchants to have samples tested at the Department's Seed Testing Station, and that if a trader does not avail himself of these facilities he cannot on the plea of ignorance free himself from responsibility in the matter.

I am,

Gentlemen,  
Your obedient Servant,  
T. P. GILL,  
*Secretary.*

To

THE VENDORS OF AGRICULTURAL SEEDS  
IN IRELAND.

A.B. MEMO. No. 17.

## DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

### MARKETING HONEY.

#### MEMORANDUM TO IRISH PRODUCERS OF, AND DEALERS IN HONEY.

Instructions as to the storing of honey after its removal from the hive, wrapping and glazing sections, and packing honey for transit,

are given in "Instruction in Bee-Keeping for the use of Irish Bee-Keepers," price 9d., obtainable either directly or through any bookseller, from E. Ponsonby, Limited, Grafton Street, Dublin, postage, threepence extra.

Weeping or wet sections are strongly objected to by buyers. They are useless for glazing, and very objectionable for wrapping, and are excluded from all grades under the grading rules approved by the Department and the Irish Beekeepers' Association, as also are sections containing granulated honey. Weeping and granulation are mainly due to the storage of sections in too low a temperature. When sections have been removed from the hive, they should be graded and packed in tin, cardboard, paper, or wooden boxes, which should be stored in a cupboard or box in a warm dry room, the temperature of which should be maintained, if possible, at not less than 60° F. Sections, whether in boxes or otherwise, should not be stored in such a manner that the comb of any section is likely to be fractured by the weight of the sections above it.

Those who have not got suitable accommodation for storing section honey, should endeavour to dispose of it before the weather becomes so cool as to produce crystallization and weeping.

Grading for colour and appearance can only be done satisfactorily by daylight.

Much damage is caused to sections during transit, in consequence of their being packed in crates of insufficient strength, or with an insufficiency of packing material. Sections of 16 ounces and upwards are especially liable to have the capping of cells near the wood fractured, if pressure is applied to the section wood. Care should, therefore, be taken to avoid any likelihood of damage of this nature occurring. Sections for transit should be wrapped, and then packed in light wooden, cardboard, or corrugated paper boxes; if wooden boxes are used they should be wrapped in paper to keep out dirt: these small boxes should be very carefully packed in strong cases, the boards of which should be of such thickness that they will not bend much if subjected to pressure during transit. Large wine cases, tea cases, and match cases, are generally suitable for this purpose. There should be, at least, 1½", preferably 2", of neatly drawn straw packing between the small boxes containing sections and the outer case. Hay packing should not be used. Non-odorous wood wool is very suitable as a packing material.

#### RETURNABLE CASES.

Some shippers of honey find it advantageous to pack in their own strong returnable cases, in order to avoid the almost certain injury to sections which will occur if they are packed in cases of too light construction. The following specification has been found suitable for cases to hold six boxes or cartons containing twelve sections each:—

Internal dimensions: length 33", width 17", depth 14". Thickness of ends ½", sides, tops, and bottoms ½". Two battens each 3" x ½", to be nailed across both top and bottom outside. Sides to project ½" beyond each end, and two corner battens each 15" x 2½" x ½" to be nailed on each end, so that the ends of the battens shall be flush with the top and bottom when fixed on. Ends to be bound with hoop iron. The sides should be nailed to the ends and to

the corner battens. Rope handles to be fitted at each end. Small narrow cleats should be so fixed inside the lid at each corner as to keep the lid in position, but not to touch the boxes of sections. The lid should be firmly tied on by cords passed through holes in it and in the sides.

A case to hold eight boxes containing twelve sections each, should measure internally not less than 30" x 23" x 14". In other respects the construction should be as for a six dozen case.

Returnable cases should be charged for. The objection to the use of small wooden boxes for holding sections is that buyers sometimes object to return them: cardboard or corrugated paper boxes are regarded as non-returnable.

Cases should bear a label having the words "HONEYCOMB, FRAGILE. THIS SIDE UP," printed on it in large type.

#### LABELLING AND PACKING.

It is important that sections should always be kept with their tops up; therefore, wrapped sections, and boxes of 12 sections, should be clearly marked so as to indicate which side is to be kept up. The grade of the contents should be clearly marked on the outside of each box containing 12 sections. So far as possible, only one grade of honey should be packed in one case, and when more than one grade of honey is sent in one consignment, it is well to indicate the contents of each case.

#### CONVEYANCE BY ROAD.

Sections should be conveyed in vehicles fitted with springs: when that is not possible, the packages containing the sections should be placed on a good bed of straw, and the vehicle should be driven slowly, especially if the road surface is rough.

It is to the interest of producers and buyers of honey that it shall be graded subject to generally accepted conditions.

The following rules and conditions for the grading of honey have been adopted by the Irish Beekeepers' Association, and they are recommended for adoption by all Irish producers of honey and dealers in honey.

#### RULES FOR GRADING IRISH HONEY.

##### *General Conditions applying to all grades.*

1. (a) The wood of sections shall not exceed in weight fifteen to the pound.

(b) The gross weight of a section shall be the weight of the wood, wax, and honey, without the wrappings, glazing, or ornament.

(c) Section honey shall show no signs of granulation.

(d) The comb of sections must be clean, free from bruising, from brood marks, from the least sign of weeping, or tendency to weep, and the surface of the comb must be absolutely dry on arrival at its destination.

(e) Splits for holding foundation shall be properly closed. The sections shall not be out of square sufficiently to prevent them being properly glazed or packed for transit. The wood is to be clean, free from objectionable stain, and all adhering wax and propolis must be removed from the outer surface.



(f) Sections with cappings of a deep yellow colour, such as would be produced by ragweed, shall be excluded from grading.

(g) The comb shall not at any place extend to the widest part of the wood.

(h) In the following conditions the term "pop-hole" shall include any hole through the comb from face to face.

2. The following classes shall be recognised for grading purposes :—

"Graded," (3rd) Yellow Label.

"Select," (2nd) Blue Label.

"Fancy" (1st) Red Label.

*Special Conditions for "Fancy" Grade.*

3. (a) *Weight*.—Not less than 16 ounces, gross.

(b) *Attachment, filling and sealing*.—The comb shall be attached firmly to the wood all round. All the cells shall be filled and sealed, except the row next the wood, and the section shall not contain such unsealed honey as would invalidate it under part of General Condition 1 (d), i.e., "The surface of the comb must be absolutely dry on arrival at its destination." Pop-holes will be permissible at corners next the wood only.

(c) *Finish and colour*.—Both faces of the comb must be free from marked unevenness, or marked variation in colour.

*Special Conditions applying to "Select" Grade.*

4. (a) *Weight*.—Not less than 15 ounces, gross.

(b) *Attachment, filling and sealing*.—The comb shall be attached firmly to the wood on all sides, but may contain pop-holes on any part of the surface, provided that any pop-hole removed from the wood shall not exceed  $\frac{3}{8}$ ". Attention is drawn again to that part of General Condition 1 (d) which reads, "The surface of the comb must be absolutely dry on arrival at its destination."

(c) *Finish*.—Slightly more unevenness of comb surface, and of variation in colour than that authorised for "Fancy" Grade shall be permitted in this grade.

*Special Conditions applying to "Graded" Grade.*

5. (a) *Weight*.—Not less than 14 ounces, gross.

(b) *Attachment, filling and sealing*.—Exactly as for Select Grade.

(c) *Finish*.—As for Select Grade; except that considerable unevenness of comb surface may be permitted.

**RULES FOR THE GRADING OF RUN OR EXTRACTED HONEY.**

6. (a) *Density*.—The Imperial Gallon of honey shall weigh not less than 14 pounds, nett.

(b) *Clearness*.—The honey shall be free from scum, sediment, or suspended matter.

(c) *Fermentation*.—There shall be no sign of fermentation.

(d) *Granulation*.—Granulation shall not exclude from grading.

Special attention is directed to the rules providing that the comb of section honey shall show no signs of weeping or of a tendency to weep, that the honey in sections shall be free from granulation, and that the comb of sections shall contain no unsealed honey which

would cause the surface of the comb to be other than absolutely dry on arrival at its destination.

Extracted honey may be forwarded in tins holding about 56 lbs. each. Lever lid tins are very suitable. They should be packed in wooden cases or crates. Extracted honey in glass jars should be very carefully packed in wooden cases.

### MARKETING HONEY.

Assistance will be given in the marketing of honey subject to the following conditions :—

1. The honey must be graded in accordance with the rules for grading approved by the Irish Beekeepers' Association, and it must be packed in accordance with the instructions in A.B. Memo. No. 17.

2. The quantity for disposal by one association or individual should be not less than 560 lb. of honey, coming within the grades specified by the Irish Beekeepers' Association.

3. If the seller is a producer of honey resident in a district for which there is a beekeepers' association having an approved grader and packer, the honey must be graded and packed under the immediate supervision of that association's grader and packer. In other circumstances the seller must satisfy the Department that the honey will be graded and packed as stated in Condition 1.

4. It is not considered desirable that beekeepers should endeavour to market their honey individually under this scheme, but that all honey should be marketed through the local beekeepers' association.

5. Where no beekeepers' association exists, beekeepers who arrange to dispose of their produce collectively subject to the above conditions, will be assisted to market their produce subject to Condition 2.

6. So far as circumstances permit, arrangements will be made to give instruction in grading and packing honey to members of beekeepers' associations at suitable centres, provided that the local association arranges for providing suitable premises and a sufficient supply of honey for instruction purposes, say from five crates to two gross of sections.

7. Each association should endeavour to provide one or more persons who will undertake to grade and pack, or to supervise grading and packing, for members of the association, subject to such terms as to remuneration as the association may arrange. Such graders and packers must be certified by the Department's Beekeeping Expert, or by the Secretary of the Irish Beekeepers' Association, as competent to grade and pack in accordance with the grading rules of the Irish Beekeeping Association, and the packing instructions in A.B. Memo. No. 17; and all honey sold by any such association or its members under this scheme must be graded and packed by or under the immediate supervision of such grader and packer. Special attention will be given to the proper instruction of graders and packers employed by associations.

8. In order to avoid causing inconvenience to beekeepers, sections not exceeding two gross in all, which have been brought in by them for the purpose of instruction in grading and which are considered by the Instructor to come within the grades approved by the Irish Beekeepers' Association, will be purchased at such prices as are justified by the condition of the wholesale market, provided that all necessities for wrapping and packing have been supplied.

## INSTRUCTION IN THE GRADING AND PACKING OF HONEY.

The following requirements must be provided by those responsible for making arrangements locally for instruction in the grading and packing of honey.

(a) A suitable room or store in which the honey can be unpacked, graded and packed.

(b) At least one dozen cartons for holding twelve sections each. Also one or more empty cases, as specified in A.B. Memo. No. 17.

(c) Some clean, dry, sound oat straw, or non-odorous wood wool, such as would be suitable for egg packing.

(d) A weighing machine of capacity up to 2 lbs. by ounces.

(e) A sufficient supply of waxed papers for wrapping.

(f) A pot of paste and paste brush.

(g) A kitchen table measuring about 5 feet  $\times$  3 feet.

(h) A kitchen knife.

(i) A hammer and nails for closing packing cases.

(k) From 5 crates to 2 gross of sections.

(l) If instruction is desired in the marketing of extracted honey in bulk, a 56 lb. tin of extracted honey should be provided, and if instruction is required in the bottling of extracted honey, a supply of screw cap bottles should be provided in addition to 56 lbs. of extracted honey in a tin fitted with a treacle tap, and also a suitable packing case to hold the bottles.

## II.—TECHNICAL INSTRUCTION.

FORM S. 108.

### DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND,

UPPER MERRION STREET, DUBLIN.

TELEGRAPHIC ADDRESS—

“RESOURCES, DUBLIN.”

### I.—SPECIAL EXAMINATIONS FOR TEACHERS' QUALIFICATIONS IN EXPERIMENTAL SCIENCE AND DOMESTIC ECONOMY, 1916.

The Department will hold, in 1916, Special Examinations for Teachers' Qualifications in Experimental Science and Domestic Economy, for Teachers who are actually engaged in teaching in Day Secondary Schools recognised by the Department. Applications for admission to these examinations from other Teachers will, however, be favourably considered, provided there is a likelihood that the applicants will be engaged in the near future in teaching Experimental Science or Domestic Economy in Day Secondary Schools working in connection with the Department. All such applications must be accompanied by a letter setting out fully the circumstances which might be thought likely to influence the Department to give the application favourable consideration.

Each examination will be divided into two portions, the first a written test to be held on Saturday, the 29th April; and the second

a practical test to be held subsequently on a date to be fixed by the Department, and which will be duly notified to candidates. Provisional recognition to give instruction will be granted to those candidates who pass the examination.

If a sufficient number of approved applications are received examinations will be held in the subjects mentioned below.

The written tests on Saturday, the 29th April, will be held in accordance with the following Time Table :—

From 10 a.m. to 1 p.m.

From 2 p.m. to 5 p.m.

First Year Syllabus of the Preliminary Course.

Physics (Third Year Syllabus—General Physics and Heat).

Chemistry (Third Year Syllabus).

Mechanics (Third Year Syllabus).

Botany (Third Year Syllabus).

Physiology and Hygiene (Third Year Syllabus).

Physical and Commercial Geography (Third Year Syllabus).

Domestic Economy (First Year Training Course).

Domestic Economy (Third Year Training Course).

Second Year Syllabus of the Preliminary Course.

Physics (Fourth Year Syllabus—Course A).

Physics (Fourth Year Syllabus—Course B).

Chemistry (Fourth Year Syllabus).

Mechanics (Fourth Year Syllabus).

Botany (Fourth Year Syllabus).

Physiology and Hygiene (Fourth Year Syllabus).

Physical and Commercial Geography (Fourth Year Syllabus).

Domestic Economy (Second Year Training Course).

A fee of 2s. 6d. will be charged for examination in each subject, but this fee will not be exigible in the case of a teacher who has, within two calendar years previous to the date of the examination, made regular attendance at one of the Department's Summer Courses of Instruction for Teachers in the subject of the examination, or who has made not less than 100 hours' attendance at a Summer or other Special Course of instruction in the subject, conducted under the conditions of Section III. of the Department's Programme for Technical Schools and Classes.

Should a sufficient number of applications for examination be received the Department will arrange to hold the written examination at Dublin, Belfast, Cork, Londonderry, Limerick, Waterford and Galway. In very exceptional circumstances other centres might be arranged for, provided that special written application is made by School Managers before the 29th February, 1916.

Application for admission to the examination must be made not later than the 29th February, 1916, on Form S. 118, copies of which may be obtained, after the 1st January, upon application to the offices of the Department.

## 2.—REGULATIONS UNDER WHICH THE DEPARTMENT ARE PREPARED TO RECOGNISE SPECIAL COURSES OF INSTRUCTION IN EXPERIMENTAL SCIENCE AND DOMESTIC ECONOMY FOR TEACHERS IN DAY SECONDARY SCHOOLS (SEE ALSO SECTION III. OF THE PROGRAMME FOR TECHNICAL SCHOOLS AND CLASSES).

The Instructors in charge of classes for Teachers must be specially qualified, and their qualifications must be approved of by the Department for the purposes of the Special Course of instruction.

The Laboratories and Domestic Economy Rooms must also be approved of by the Department for the purposes of the Special Courses of instruction.

Attendance at theoretical instruction may not be taken into account when computing the 100 hours' practical instruction referred to in the fifth paragraph of Section 1 of this Form.

Application for the recognition of special classes for Teachers *must be made by letter*, accompanied by detailed proposals upon Form S. 54. Attendance at lessons previous to the receipt of the Department's written approval of the arrangements may not be reckoned as part of the 100 hours' practical instruction.

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FORM S. 33.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET, DUBLIN.

ROYAL COLLEGE OF SCIENCE, DUBLIN.

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### SCIENCE AND TECHNOLOGICAL SCHOLARSHIPS, AND TEACHERSHIPS IN TRAINING, 1916.

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A limited number of Scholarships and of Teacherships-in-Training, tenable at the Royal College of Science, Dublin, will be offered for competition among Students of Science and Technology in 1916.

The Scholarships are of the value of £50 per annum, and, in addition, entitle the holder to free instruction during the Associate Course, and third-class railway fare for one journey each session to and from Dublin.

A Teachership-in-Training entitles the holder to free instruction during the Associate Course, a maintenance allowance of 21s. per week for the session of about forty weeks each year, and third-class railway fare for one journey each session to and from Dublin.

The Associate Course extends over four years, and the College session lasts from the beginning of October to the end of June each year.

Candidates awarded Teacherships-in-Training will be required to enter into an undertaking that they will pursue the full Associate Course, with a view to becoming Teachers of Science in Ireland, and that, in the event of their leaving the College before obtaining the Diploma of Associateship, they will refund to the Department the sums paid to them as maintenance allowance and expenses of travelling.

Holders of Scholarships and Teacherships-in-Training will be required to devote their whole time to the work of the Associate Course, to comply with the regulations of the College, and to pass the examination required for the Associateship. The continuance of the Scholarship or Teachership-in-Training from session to session will depend upon the ability and application which the student has shown during the previous session or sessions at the College.

Holders of Scholarships and Teacherships-in-Training who may seek leave of absence from attendance at the College in order to

attend the examinations for Scholarships in other Institutions will be required to pay first the College Fee for the current term.

Candidates for Scholarships and Teacherships-in-Training must be not less than sixteen nor more than thirty years of age on the 1st June, 1916. Holders of Royal Scholarships (or, under former regulations, Royal Exhibitions or National Scholarships) awarded by the Board of Education, London, and present or past students of the Royal College of Science, are ineligible as candidates.

Candidates must have been born in Ireland, or have been resident in Ireland for three years immediately prior to the 1st June, 1916.

Candidates will have to satisfy the Department as to their knowledge of English and of one other language (Greek, Latin, Irish, French, or German). In these subjects a pass in the Senior Grade of the Intermediate Education Board's Examinations, or the equivalent of this will be accepted as satisfactory. Those candidates who cannot thus satisfy the Department as to their knowledge of the qualifying subjects will be examined on the Syllabuses prescribed for the Entrance Examination to the Royal College of Science.

The *competition* will be confined to Mathematics, Experimental Science, and Drawing.

The Syllabus in Mathematics will be the *Honours* Courses in Arithmetic with Algebra, Geometry, and Trigonometry for the Senior Grade of the Intermediate Education Board's Examinations, of 1916.

In Experimental Science, candidates will be allowed the choice of one of the following subjects of the Special Courses of Experimental Science of the Department's Programme for Day Secondary Schools:—Physics, Chemistry, Mechanics, Botany, Physiology and Hygiene, or Physical and Commercial Geography. The papers set may, however, include questions on the work of the Two Year Preliminary Course.

The Syllabus in Drawing will be the First and Second Year Syllabuses of the Programme for Day Secondary Schools.

NOTE.—Text Books, other than those referred to in the Syllabuses, are not prescribed for the examinations.

The examination will be held in Dublin on the days and at the hours shown below:—

*Tuesday, 27th June.*—Greek, Latin, Irish, French or German,  
2 p.m. to 5 p.m.

*Wednesday, 28th June.*—Mathematics (First Paper), 10 a.m. to 1 p.m.; Experimental Science (Written Examination),  
2 p.m. to 5 p.m.

*Thursday, 29th June.*—Mathematics (Second Paper), 10 a.m. to 1 p.m.; Experimental Science (Practical Examination),  
2 p.m. to 5 p.m.

*Friday, 30th June.*—Drawing, 10 a.m. to 1.10 p.m.; English,  
2 p.m. to 5 p.m.

*(These dates are subject to alteration.)*

Candidates must themselves bear any expenses incurred by them in connection with attendance at the examination.

Scholarships or Teacherships-in-Training will not be awarded to candidates who do not show in the course of the examination

that they are capable of taking full advantage of the instruction provided at the Royal College of Science. Candidates with physical defects of voice, sight, or hearing, will not be regarded as eligible for Teacherships-in-Training.

Successful candidates will be required to furnish a Medical Certificate of Health, an authenticated copy of Certificate of Birth, and satisfactory testimonials from two responsible persons.

The Department reserve the right at any time to determine without notice a Scholarship or Teachership-in-Training, upon being satisfied that its continuance is for any reason undesirable.

The decision of the Department in all questions arising in connection with the Scholarships and Teacherships-in-Training shall be final.

The Department do not undertake to employ Teachers, nor to find employment for them, at the close of the period of training.

Applications for admission to the examination must be made not later than the 31st May, on Form S. 34, copies of which may be obtained upon application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin, or to the Registrar, Royal College of Science, Upper Merrion Street, Dublin.

Applications received after the 1st June will be too late for consideration. Applications for forms are not regarded as applications for admission to the examination. Only those candidates who present an official card of admission will be permitted to attend the examination.

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FORM S. 314.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET, DUBLIN.

SCHOLARSHIPS AT THE KILLARNEY SCHOOL  
OF HOUSEWIFERY.

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The Department are prepared to offer to County Committees of Technical Instruction special facilities for the award of Scholarships for Girls, tenable at the Killarney School of Housewifery. This institution is under the Department's direct control, and has for its object the Training of Girls in such work as would fit them for domestic service or the care of a home.

The following are the conditions under which Scholarships may be awarded :—

1. Applicants for the Scholarships must be resident in a rural district, and must have been in regular attendance at one of the Courses of Instruction in Domestic Economy conducted by the Committee of Technical Instruction for the county, in the current or the previous session.

2. The scholars will be selected by the Department from the students nominated by County Committees of Technical Instruction.

Each nomination must be accompanied by a report of the Domestic Economy Instructress upon the work of the applicant at the course of instruction attended.

3. Applicants for these Scholarships may be nominated for admission to the School on the 1st February or the 16th August. Nominations should be forwarded by County Committees so as to reach the Offices of the Department on or before the 1st of January or the 16th July.

4. The Scholarships will be tenable for the full course of training, which extends over about forty-six weeks.

5. A fee of £8, being one-half of the usual fee, will be payable by the County Committee in respect of each applicant nominated by them who is awarded a Scholarship, and the parent or guardian of the scholar will be required to pay the entrance fee of £1.

6. Scholars will be required to conform to all the conditions set forth in the School Programme.

7. The Department reserve the right to determine a Scholarship without notice upon being satisfied that its continuance is for any reason undesirable.

8. The decision of the Department in all questions arising in connection with the Scholarships shall be final.

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CIRCULAR 92.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET,  
DUBLIN, *September, 1915.*

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### SPECIAL CLASSES OR COURSES OF INSTRUCTION FOR TEACHERS, CONDUCTED UNDER SECTION III. OF THE PROGRAMME FOR TECHNICAL SCHOOLS AND CLASSES.

SIR OR MADAM,

The attention of the Department has recently been directed to the fact that in several instances a large proportion of the students attending classes conducted under Section III. of the Programme for Technical Schools and Classes have not been teachers. This Section of the Programme was devised with the special object of affording facilities for the further training of teachers, and as it was expected that, as a rule, the number of students attending such classes would be small, the grants payable under its provisions were fixed at the higher rates in order to afford, in the circumstances, reasonable financial assistance to School Managers. The purposes of the classes would be defeated if students other than teachers were admitted in any considerable numbers, and consequently the Department have decided to refuse, in future, to recognise classes under this Section of the Programme unless they are confined to students of whose admission they have approved.



As a general rule the Department will not approve of the admission of students *who are not eligible for grants* under the regulations prescribed, but they will be prepared to consider exceptional cases submitted to them. In all cases in which it is proposed to admit students other than teachers in Primary or Day Secondary Schools, it will be necessary to furnish the Department with a list of the names of such students, and to give the reason, in each case, why the admission of the student is desired.

All students attending classes conducted under Section III. of the Programme, whether eligible for grants or not, must be enrolled in the Department's Registers.

I am,

Sir or Madam,

Your obedient Servant,

T. P. GILL,

*Secretary.*

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### III.—VETERINARY.

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#### MAINTENANCE OF LIVE STOCK.

The Department of Agriculture and Technical Instruction for Ireland desire to direct attention to an Order, entitled the Maintenance of Live Stock (Ireland) Order, 1915, which they have issued under the powers conferred on them by the new Maintenance of Live Stock Act, with the object of maintaining the stock of cattle and swine in Ireland.

The Order, which comes into force on 1st September, revokes the existing Slaughter of Animals (Ireland) Order, but renews the provision in that Order forbidding the slaughter in Ireland of any animal visibly or obviously in-calf or in-pig; and, in addition, prohibits the exportation of any such animals from Ireland. The Order also embodies a provision as to entry to slaughterhouses, with a view to the better enforcement of the slaughter restrictions.

Restrictions with regard to the slaughter of calves under twelve weeks old have been omitted from the new Order in view of the absence of any undue tendency, in existing circumstances, to slaughter young calves in this country.

The restrictions of exportation imposed by the Order should be noted especially by Shippers of "springer" cattle.

Copies of the Order can be obtained free on application to the Department.

THE DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
DUBLIN, 25th August, 1915.

## NOTES AND MEMORANDA.

A meeting of the Agricultural Board was held at the Offices of the Department, 4 Upper Merrion Street, on Wednesday, 22nd September. The following were present :—

**Board.** The Right Hon. T. W. Russell, M.P., Vice-President of the Department (in the Chair); Mr. John Bourke; Mr. Alexander L. Clark, J.P.; Mr. Robert Downes; Colonel Sir Nugent T. Everard, Bart., H.M.L.; Sir Josslyn Gore-Booth, Bart., D.L.; Mr. John S. F. McCance, J.P.; Mr. George Murnaghan, J.P.; Mr. John D. O'Farrell, and Mr. Patrick J. O'Neill, J.P.

Most Rev. Denis Kelly, D.D., Lord Bishop of Ross, and Alderman Henry Dale, J.P., were unavoidably prevented from attending the meeting.

Mr. J. R. Campbell, B.Sc., Assistant Secretary in respect of Agriculture; Mr. J. S. Gordon, B.Sc., Deputy Assistant Secretary in respect of Agriculture and Chief Agricultural Inspector; Mr. H. G. Smith, LL.D., Chief Clerk; Mr. T. Butler, Superintendent of Statistics and Intelligence Branch; Mr. J. V. Coyle, B.L. (who acted as Secretary to the meeting); Mr. F. J. Meyrick, M.A., and Mr. M. Killeen, Assistant to Clerk in Charge of Accounts, were also present.

Mr. T. P. Gill, Secretary of the Department, was unable to be present owing to his having to fulfil an important engagement in the country.

The Board had under consideration the progress of the work under County Committee schemes, together with various other matters, including the Food Production Campaign, winter schools and field experiments, Development grants, instruction in hide flaying, purchase of hay for the Army, and some business arising out of the administration of the Sea and Coast Fisheries Fund.

The Advisory Committee on Flax held its Twentieth Meeting at Belfast, on Friday, 24th September, 1915.

**Advisory Committee on Flax.** Present :—Mr. J. R. Campbell, Assistant Secretary in respect of Agriculture (in the Chair); Mr. R. A. Anderson; Mr. Frank Barbour; Mr. Harold Barbour; Mr. A. L. Clark; Mr. A. T. Clarke; Mr. J. G. Crawford; Mr. P. Kelly; Mr. F. B. Small; Mr. James Stewart, and Mr. John W. Stewart.

The Vice-President of the Department was present during portion of the proceedings.

Mr. Gordon, Deputy Assistant Secretary in respect of Agriculture. Messrs. Hinchcliff and Megaw, Inspectors, were also present.

Mr. F. J. Meyrick acted as Secretary to the meeting.

The Committee had under consideration the report of the Department's Flax Inspector on the varieties of seed, from sources hitherto unavailed of, which were tested in 1915 with a view to ascertaining their suitability for sowing in Ireland. The question of the prices paid by scutch mill owners to farmers for tow was also considered.

Representatives of the leading importers of flax seed attended at the Department's request to discuss the position with regard to the supplies of seed available for sowing the 1916 crop and the quantities required to be imported. Recommendations were made as to the course of action to be taken by the importers and the Department in order to secure the necessary supplies from abroad.

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In the past season early potatoes yielded well in the Dungarvan and Youghal districts, in which lifting was commenced about June 8th. Most of the Dungarvan produce was sold to local buyers, the price for potatoes delivered before June 16th in the buyers packages, being £7 per ton. Youghal growers sent their earliest potatoes to Glasgow, where they realised 14s. per cwt. on June 10th, they continued to send to Glasgow until June 17th, after which heavy arrivals from Ayrshire caused prices to fall.

Sligo growers suffered most from mid-May frosts. They began digging about June 14th, and sold most of their produce to a north of Ireland firm at prices commencing at 6s. to 7s. per cwt.

The Department issued market advices to growers at frequent intervals from the end of May to the middle of July.

## STATISTICAL

## FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast. *(Erris Head to Torr Head.)				East Coast. (Torr Head to Carnsore Point.)			
	1915.		1914.		1915.		1914.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, . . . . .	12	10	11	18	4	12	11	37
Soles, . . . . .	10	31	17	74	81	346	65	265
Turbot, . . . . .	3	7	1	5	17	82	30	127
Total Prime Fish, .	25	48	29	97	102	440	106	429
Cod, . . . . .	—	—	—	—	415	691	971	1,031
Conger Eel, . . . .	2	2	—	—	113	114	280	164
Haddock, . . . . .	—	—	29	19	10	19	256	260
Hake, . . . . .	—	—	—	—	105	192	394	479
Herrings, . . . . .	66	43	110	60	62,790	41,052	48,705	13,797
Ling, . . . . .	1	1	—	—	5	4	197	86
Mackerel, . . . . .	227	110	839	246	1,846	443	221	46
Plaice, . . . . .	240	287	361	341	382	819	376	508
Ray or Skate, . . .	12	5	17	2	229	159	259	132
Sprats, . . . . .	—	—	—	—	—	—	—	—
Whiting, . . . . .	340	236	383	137	304	418	475	373
All other except Shell Fish	226	103	984	389	449	363	955	414
Total, . . . . .	1,139	835	2,752	1,291	66,750	44,714	53,195	17,719
SHELL FISH :—	No.		No.		No.		No.	
Crabs, . . . . .	11,884	145	10,830	29	14,405	107	17,839	103
Lobsters, . . . . .	3,659	111	24,812	712	10,047	287	14,638	461
Mussels, . . . . .	Cwt. 120	11	Cwt. —	—	Cwt. —	—	Cwt. 70	5
Oysters, . . . . .	No. —	—	No. —	—	No. —	—	No. —	—
Other Shell Fish, .	Cwt. 20	3	Cwt. 60	6	Cwt. 49	29	Cwt. 279	53
Total, . . . . .	—	270	—	747	—	423	—	612
Total value of Fish landed	—	1,105	—	2,038	—	45,137	—	18,331

NOTE.—The above figures are subject

\* In monthly returns previous to and including December, 1914, the extent of each Torr Head; East Coast—Torr Head to Carnsore Point; South Coast—

## TABLES.

## IRELAND.

as landed on the IRISH COASTS during the month of July, 1915, as corresponding period in 1914.

South Coast. (Carnsore Point to Loop Head.)				West Coast. (Loop Head to Erris Head.)				Total.			
1915.		1914.		1915.		1914.		1915.		1914.	
Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
6	12	21	44	2	4	—	—	24	38	43	99
77	325	75	329	28	123	45	143	196	825	202	811
4	16	10	39	2	14	12	61	26	119	53	232
87	353	106	412	32	141	57	204	246	982	298	1,142
21	24	26	22	—	—	—	—	436	715	997	1,053
269	136	55	25	—	—	—	—	384	252	335	189
8	12	9	10	2	2	—	—	20	33	294	289
6	8	—	—	—	—	56	23	111	200	450	502
1,041	698	452	178	120	114	670	305	64,017	41,907	49,937	14,340
27	34	40	29	—	—	5	4	33	39	242	119
4,363	1,860	2,331	617	765	296	2,240	628	7,201	2,709	5,631	1,537
135	200	205	229	48	69	245	166	805	1,375	1,187	1,244
92	46	15	6	21	17	2	1	354	227	293	141
43	11	—	—	—	—	—	—	43	11	—	—
—	—	14	6	2	4	120	30	646	658	992	546
157	91	441	195	238	110	475	310	1,070	667	2,855	1,308
6,249	3,473	3,694	1,729	1,228	753	3,870	1,671	75,366	49,775	63,511	22,410
No.		No.		No.		No.		No.		No.	
2,098	20	10,696	93	204	3	316	2	28,591	275	39,681	227
21,405	616	51,887	2,001	29,595	965	51,546	1,496	64,706	1,979	142,883	4,660
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
223	22	58	4	—	—	—	—	343	33	128	9
No.		No.		No.		No.		No.		No.	
—	—	—	—	—	—	—	—	—	—	—	—
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
169	20	120	12	298	53	168	30	536	105	627	101
—	678	—	2,110	—	1,021	—	1,528	—	2,392	—	4,997
—	4,151	—	3,839	—	1,774	—	3,199	—	52,167	—	27,407

to correction in Annual Returns.

of the Coasts referred to therein was as follows:—North Coast—Rossan Point to Carnsore Point to Kenmare; West Coast—Kenmare to Rossan Point.

## FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast. * (Erris Head to Torr Head.)				East Coast. (Torr Head to Carnsore Point.)			
	1915.		1914.		1915.		1914.	
	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, . . . . .	5	5	13	14	2	6	10	29
Soles, . . . . .	27	103	22	92	72	353	48	202
Turbot, . . . . .	5	19	9	25	18	90	30	131
Total Prime Fish, .	37	127	44	131	92	449	88	362
Cod, . . . . .	—	—	—	—	490	955	550	698
Conger Eel, . . . .	10	13	—	—	165	154	318	203
Haddock, . . . . .	—	—	14	11	12	26	70	132
Hake, . . . . .	—	—	—	—	260	551	258	390
Herrings, . . . . .	1,120	1,010	243	92	30,806	26,804	20,977	6,908
Ling, . . . . .	—	—	—	—	46	46	196	91
Mackerel, . . . . .	379	156	109	71	1,805	521	294	45
Plaice, . . . . .	324	313	339	321	477	705	445	742
Ray or Skate, . . .	152	38	86	21	368	260	373	205
Sprats, . . . . .	—	—	—	—	—	—	—	—
Whiting . . . . .	142	67	94	52	368	531	432	551
All other except Shell Fish	345	130	19	14	620	516	717	408
Total, . . . . .	2,509	1,854	1,038	713	35,509	31,518	24,718	10,735
SHELL FISH :— . . .	No.		No.		No.		No.	
Crabs, . . . . .	1,482	11	3,030	36	8,534	63	15,456	93
Lobsters . . . . .	10,201	249	11,768	268	9,726	269	11,643	258
Mussels, . . . . .	Cwt.		Cwt.		Cwt.		Cwt.	
Oysters, . . . . .	—	—	—	—	480	75	184	28
Other Shell Fish, .	No.		No.		No.		No.	
	Cwt.		Cwt.		Cwt.		Cwt.	
Total, . . . . .	20	3	30	3	122	72	86	26
Total value of Fish landed	—	2,117	—	1,020	—	31,997	—	1,140

NOTE.—The above figures are subject

\* In monthly returns previous to and including December, 1914, the extent of each Head; East Coast—Torr Head to Carnsore Point; South Coast—

## IRELAND.

as landed on the IRISH Coasts during the month of August, 1915, as corresponding period in 1914.

South Coast. (Carnsore Point to Loop Head.)				West Coast. (Loop Head to Erris Head.)				Total.			
1915.		1914.		1915.		1914.		1915.		1914.	
Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
13	25	23	44	3	6	—	—	23	42	46	87
62	270	63	260	30	118	30	89	191	844	163	643
7	28	11	42	12	52	12	55	42	189	62	253
82	323	97	346	45	176	42	144	256	1,075	271	983
1	1	16	15	—	—	—	—	491	956	566	713
313	161	13	6	3	2	—	—	491	330	331	209
—	—	—	—	—	—	38	31	12	26	122	174
—	—	—	—	—	—	—	—	260	551	258	390
928	434	550	154	333	171	96	78	33,192	28,419	21,866	7,232
3	2	14	11	—	—	—	—	49	48	210	102
1,445	552	421	126	971	243	98	49	4,600	1,472	1,012	291
137	170	158	175	60	82	40	31	998	1,270	982	1,269
242	117	2	1	24	24	—	—	786	439	461	227
6	2	3	1	—	—	—	—	6	2	3	1
1	1	1	1	15	6	63	22	526	605	595	626
221	157	28	116	904	739	283	177	2,090	1,542	1,308	715
3,379	1,920	1,564	952	2,360	1,443	665	532	43,757	36,735	27,985	12,932
No.		No.		No.		No.		No.		No.	
2,814	28	2,368	19	972	5	—	—	13,802	107	20,854	148
27,572	881	22,042	773	46,346	1,412	27,027	702	93,845	2,811	72,480	2,001
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
—	—	110	8	—	—	—	—	480	75	294	36
No.		No.		No.		No.		No.		No.	
—	—	—	—	—	—	—	—	—	—	—	—
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
134	18	70	7	504	90	360	63	780	183	546	99
—	927	—	807	—	1,507	—	765	—	3,176	—	2,284
—	2,847	—	1,759	—	2,950	—	1,297	—	39,911	—	15,216

to correction in Annual Returns.

of the Coasts referred to therein was as follows : North Coast—Rossan Point to Torr Carnsore Point to Kenmare; West Coast—Kenmare to Rossan Point.

## FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast. *(Erris Head to Torr Head).				East Coast. (Torr Head to Carnsore Point).			
	1915.		1914.		1915.		1914.	
	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, . . . . .	1	1	5	6	6	27	8	21
Soles, . . . . .	11	54	11	53	76	372	52	276
Turbot, . . . . .	3	8	9	19	22	114	24	114
Total Prime Fish, . .	15	63	25	78	104	513	84	411
Cod, . . . . .	13	9	3	2	290	675	875	1,098
Conger Eel, . . . . .	20	36	—	—	189	184	438	273
Haddock, . . . . .	—	—	36	21	18	40	47	62
Hake, . . . . .	—	—	50	15	243	530	363	515
Herrings . . . . .	10,830	5,297	11,059	3,846	20,039	13,866	10,032	3,144
Ling, . . . . .	—	—	25	9	47	45	107	63
Mackerel, . . . . .	256	82	68	26	1,287	496	110	43
Plaice, . . . . .	126	160	257	239	474	974	807	1,101
Ray or Skate, . . . .	116	30	118	31	349	256	759	364
Sprats, . . . . .	—	—	—	—	—	—	—	—
Whiting, . . . . .	22	8	78	50	335	470	493	504
All other except Shell Fish	43	17	101	43	836	670	840	418
Total, . . . . .	11,441	5,702	11,820	4,360	24,211	18,719	14,955	7,996
SHELL FISH :— . . . .	No.		No.		No.		No.	
Crabs, . . . . .	3,386	23	1,390	17	6,120	32	5,347	49
Lobsters, . . . . .	2,902	73	10,661	247	4,141	118	4,559	130
Mussels . . . . .	—	—	80	7	60	11	27	4
Oysters, . . . . .	—	—	—	—	500	1	2,744	4
Other Shell Fish, . .	Cwt. 35	4	Cwt. 40	5	Cwt. 130	54	Cwt. 115	32
Total, . . . . .	—	100	—	276	—	216	—	219
Total value of Fish landed	—	5,802	—	4,636	—	18,935	—	8,215

\*In monthly returns previous to and including December, 1914, the extent of each of the Coast—Torr Head to Carnsore Point; South Coast—Carnsore



## IRELAND.

as Landed on the Irish Coasts during the month of September, 1915, as corresponding period in 1914.

South Coast. (Carnsore Point to Loop Head).				West Coast. (Loop Head to Erris Head).				Total.			
1915.		1914.		1915.		1914.		1915.		1914.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
13	28	19	36	—	—	—	—	20	56	32	63
31	165	53	216	23	86	70	284	141	677	186	829
9	36	7	27	10	62	16	80	44	220	56	240
53	229	79	279	33	148	86	364	205	953	274	1,132
—	—	2	1	—	—	—	—	303	684	880	1,101
16	12	3	1	2	1	—	—	227	233	441	274
—	—	—	—	—	—	61	46	18	40	144	129
—	—	—	—	20	10	—	—	263	540	413	530
1,227	581	1,734	627	2,808	1,438	131	83	34,904	21,182	22,956	7,700
—	—	—	—	—	—	—	—	47	45	132	72
2,476	790	5,698	1,929	175	98	576	260	4,194	1,466	6,452	2,258
83	116	154	178	26	33	8	7	709	1,283	1,226	1,525
145	42	153	30	26	8	—	—	636	336	1,030	425
5	3	—	—	—	—	—	—	5	3	—	—
2	2	12	7	—	—	82	96	359	480	665	657
201	121	455	172	484	343	124	73	1,564	1,151	1,520	706
4,208	1,896	8,290	3,224	3,574	2,079	1,068	929	43,434	28,396	36,133	16,509
No.		No.		No.		No.		No.		No.	
956	9	1,032	9	240	1	—	—	10,702	65	7,769	75
12,428	400	4,407	147	11,379	381	7,700	186	30,850	972	27,327	710
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
332	25	127	9	—	—	—	—	392	36	234	20
No.		No.		No.		No.		No.		No.	
2,142	4	—	—	—	—	—	—	2,642	5	2,744	4
Cwt.		Cwt.		Cwt.		Cwt.		Cwt.		Cwt.	
231	30	100	10	616	110	646	112	1,012	198	901	159
—	468	—	175	—	492	—	298	—	1,276	—	968
—	2,364	—	3,399	—	2,571	—	1,227	—	29,672	—	17,477

to correction in Annual Returns.  
Coasts referred to therein was as follows :—North Coast—Rossan Point to Torr Head; East Point to Kenmare; West Coast—Kenmare to Rossan Point.

STATEMENT of the TOTAL QUANTITY of FISH landed on the ENGLISH and WELSH COASTS during the Month and Nine Months ended 30th September, 1915, compared with the corresponding periods of the Year 1914.

KINDS OF FISH.	September.		Nine months ended 30th September.	
	1915.	1914.	1915.	1914.
QUANTITY.				
	Cwt.	Cwt.	Cwt.	Cwt.
Brill, . . . . .	506	1,139	6,272	15,011
Soles, . . . . .	2,258	4,130	22,325	49,621
Turbot, . . . . .	1,263	1,822	18,246	48,652
Prime Fish not separately distinguished, . . . . .	—	—	—	1,082
Total Prime Fish, . . . . .	4,027	7,091	46,843	114,366
Bream, . . . . .	3,985	10,621	25,571	71,839
Catfish, . . . . .	3,569	22,145	45,884	134,037
Coalfish, . . . . .	10,921	39,228	142,762	366,983
Cod, . . . . .	70,917	127,075	1,194,184	2,188,843
Conger Eels, . . . . .	4,982	5,182	44,200	45,844
Dabs, . . . . .	7,485	7,603	60,485	76,613
Dogfish, . . . . .	5,736	2,017	33,519	26,677
Dory, . . . . .	37	117	435	1,666
Flounders or Flukes, . . . . .	273	303	2,545	5,872
Gurnards, . . . . .	3,347	10,142	39,398	80,898
Haddock, . . . . .	110,358	108,788	941,275	996,866
Hake, . . . . .	7,245	40,489	131,411	498,496
Halibut, . . . . .	2,608	8,848	21,052	68,962
Latchets (Tubs), . . . . .	56	151	931	2,282
Lemon Soles, . . . . .	1,818	3,406	17,315	38,993
Ling, . . . . .	2,622	13,912	47,930	159,377
Megrim, . . . . .	1,968	9,547	18,909	62,850
Monks (or Anglers), . . . . .	1,492	3,029	15,240	26,058
Mullet (Red), . . . . .	—	—	5	71
Plaice, . . . . .	16,045	29,002	174,976	470,083
Pollack, . . . . .	269	458	11,617	10,780
Skates and Rays, . . . . .	11,815	26,710	155,196	275,879
Torsk, . . . . .	507	3,761	9,136	23,672
Whiting, . . . . .	21,543	18,886	154,207	305,635
Witches, . . . . .	244	3,732	4,543	26,827
Herrings, . . . . .	168,023	234,927	260,830	714,138
Mackerel, . . . . .	10,622	10,322	248,224	255,641
Mullet (Grey), . . . . .	3	12	648	402
Pilchards, . . . . .	8,896	27,877	12,806	38,323
Sprats, . . . . .	25	241	49,537	49,356
Whitebait, . . . . .	59	17	2,852	3,156
Fish not separately distinguished, . . . . .	13,316	14,385	128,213	281,373
Total Wet Fish, . . . . .	494,813	790,024	4,041,679	7,422,858
Shell Fish:—	No.	No.	No.	No.
Crabs, . . . . .	230,747	231,718	4,192,305	4,561,231
Crawfish (Crayfish) . . . . .	7,542	2,238	25,392	28,101
Lobsters, . . . . .	34,181	33,701	363,369	553,458
Oysters, . . . . .	2,625,012	1,730,542	19,729,971	16,168,619
Other Shell Fish, . . . . .	Cwt. 38,001	Cwt. 46,470	Cwt. 342,309	Cwt. 403,920

NOTE.—The figures for 1915 are subject to revision.

**STATEMENT of the TOTAL VALUE of FISH landed on the ENGLISH and WELSH COASTS during the Month and Nine Months ended 30th September, 1915, compared with the corresponding periods of the Year 1914.**

KINDS OF FISH.	September.		Nine months ended 30th September.	
	1915.	1914.	1915.	1914.
	VALUE.			
	£	£	£	£
Brill, . . . . .	2,740	4,188	27,114	49,478
Soles, . . . . .	19,853	25,964	176,034	320,576
Turbot, . . . . .	8,749	9,148	88,975	198,169
Prime Fish not separately distinguished, . . . . .	—	—	—	1,712
<b>Total Prime Fish, . . . . .</b>	<b>31,342</b>	<b>39,300</b>	<b>292,123</b>	<b>569,935</b>
Bream, . . . . .	2,867	2,888	20,370	24,879
Catfish, . . . . .	3,239	10,074	44,426	60,058
Coalfish, . . . . .	10,755	16,280	98,590	112,262
Cod, . . . . .	112,279	107,406	1,365,721	1,342,593
Conger Eels, . . . . .	5,994	3,337	47,151	31,390
Dabs, . . . . .	11,485	7,511	106,605	75,248
Dogfish, . . . . .	4,428	847	22,624	9,037
Dory, . . . . .	69	134	637	1,555
Flounders or Flukes, . . . . .	358	304	2,822	4,326
Gurnards, . . . . .	2,201	2,634	22,606	25,922
Haddock, . . . . .	160,400	84,352	1,263,727	830,790
Hake, . . . . .	15,917	56,018	249,333	545,083
Halibut, . . . . .	12,663	25,826	92,295	226,432
Latchets (Tubs), . . . . .	66	85	1,054	1,314
Lemon Soles, . . . . .	8,310	10,288	67,160	111,774
Ling, . . . . .	3,382	6,827	46,600	81,355
Megrims, . . . . .	3,694	9,096	31,037	56,650
Monks (or Anglers), . . . . .	1,714	1,833	14,448	16,074
Mullet (Red), . . . . .	—	—	25	230
Plaice, . . . . .	47,150	55,859	454,133	690,427
Pollack, . . . . .	368	345	10,320	7,611
Skates and Rays, . . . . .	15,025	19,819	172,739	211,556
Torsk, . . . . .	519	2,009	6,307	10,427
Whiting, . . . . .	26,421	12,693	196,819	208,097
Witches, . . . . .	715	4,651	11,261	33,466
Herrings, . . . . .	143,879	108,060	238,318	278,082
Mackerel, . . . . .	8,303	4,303	170,510	128,821
Mullet (Grey), . . . . .	11	57	982	984
Pilchards, . . . . .	4,014	9,146	5,585	13,710
Sprats, . . . . .	6	48	9,222	9,910
Whitebait . . . . .	199	20	4,854	6,828
Fish not separately distinguished, . . . . .	10,106	5,540	108,426	166,248
<b>Total Wet Fish, . . . . .</b>	<b>647,879</b>	<b>607,580</b>	<b>5,179,830</b>	<b>5,892,874</b>
Shell Fish:—				
Crabs, . . . . .	2,867	2,502	46,178	50,392
Crawfish (Crayfish), . . . . .	599	117	2,056	2,260
Lobsters, . . . . .	1,653	1,431	17,173	27,354
Oysters, . . . . .	7,094	5,891	53,808	47,448
Other Shell Fish, . . . . .	12,224	10,949	89,475	93,347
<b>Total Shell Fish, . . . . .</b>	<b>24,437</b>	<b>20,890</b>	<b>208,690</b>	<b>220,801</b>
<b>Total Value . . . . .</b>	<b>672,316</b>	<b>628,470</b>	<b>5,388,520</b>	<b>6,113,675</b>

STATEMENT of the TOTAL QUANTITY of the FISH landed on the SCOTTISH COASTS during the Month and Nine Months ended 30th September, 1915, compared with the corresponding periods of the year 1914.

KINDS OF FISH.	September.		Nine Months ended 30th September.	
	1915.	1914.	1915.	1914.
	Quantity			
	Cwt.	Cwt.	Cwt.	Cwt.
Herrings . . . . .	56,672	54,063	528,496	4,247,142
Sprats . . . . .	—	407	2,360	5,347
Sparlings . . . . .	72	95	215	215
Mackerel . . . . .	9,040	5,885	65,417	67,592
Cod and Codling . . . . .	19,716	39,018	340,172	568,841
Ling . . . . .	5,568	19,508	71,679	173,135
Torsk (Tusk) . . . . .	656	1,366	8,629	15,388
Saith (Coal Fish) . . . . .	5,162	14,680	103,440	232,758
Haddocks . . . . .	61,620	53,085	415,175	401,986
Whittings . . . . .	12,956	17,176	89,979	186,736
Conger Eels . . . . .	375	1,926	9,668	22,670
Gurnards . . . . .	1,220	1,446	5,522	5,186
Catfish . . . . .	564	874	20,720	24,716
Monks (Anglers) . . . . .	1,533	1,813	8,473	17,530
Hake . . . . .	864	1,662	4,881	17,331
Squids . . . . .	4	4	31	16
Turbot . . . . .	313	268	2,050	3,203
Halibut . . . . .	1,439	4,758	14,541	37,607
Lemon Soles . . . . .	2,644	3,356	19,558	24,317
Flounders . . . . .	603	546	4,264	5,768
Plaice . . . . .	4,555	8,205	28,010	36,611
Brill . . . . .	7	58	79	320
Dabs . . . . .	2,045	1,398	8,689	7,701
Witches . . . . .	185	1,332	1,869	15,565
Megrimms . . . . .	437	715	6,891	12,554
Skates and Rays . . . . .	4,720	7,767	72,979	127,143
Unclassified kinds . . . . .	497	606	2,843	7,157
Totals . . . . .	193,467	242,017	1,836,630	6,264,535
	No.	No.	No.	No.
Shell Fish :—				
Crabs . . . . .	93,768	84,056	1,289,207	1,385,830
Lobsters . . . . .	60,361	75,766	395,284	477,873
Oysters . . . . .	46,300	44,900	373,724	527,240
	Cwts.	Cwts.	Cwts.	Cwts.
Clams . . . . .	295	315	7,395	29,364
Mussels . . . . .	18,898	13,668	119,073	90,203
Unclassified . . . . .	3,003	2,131	37,281	28,800

NOTE.—Landed by Foreign Vessels during the Nine Months ended 30th September, 1915 (not included above), 360 cwts.

The above figures are subject to correction in the Board's Annual Report

STATEMENT of the TOTAL VALUE of the FISH landed on the SCOTTISH COASTS during the Month and Nine Months ended 30th September, 1915, compared with the corresponding periods of the year 1914.

KINDS OF FISH.	September.		Nine Months ended 30th September.	
	1915.	1914.	1915.	1914.
	Value			
	£	£	£	£
Herrings . . . . .	33,900	17,756	338,320	1,276,136
Sprats . . . . .	—	80	874	643
Sparlings . . . . .	211	176	559	576
Mackerel . . . . .	3,102	1,494	18,849	12,623
Cod and Codling . . . . .	24,444	28,524	333,776	330,816
Ling . . . . .	4,984	5,965	51,470	63,319
Torsk (Tusk) . . . . .	745	661	7,601	5,535
Saith (Coal Fish) . . . . .	2,524	3,365	41,287	44,878
Haddocks . . . . .	60,079	37,481	408,748	327,100
Whittings . . . . .	10,141	10,529	67,340	104,985
Conger Eels . . . . .	319	691	6,062	10,202
Gurnards . . . . .	330	142	1,566	794
Catfish . . . . .	423	283	12,078	7,371
Monks (Anglers) . . . . .	846	425	4,277	4,722
Hake . . . . .	1,124	1,376	7,714	12,766
Squids . . . . .	—	—	12	1
Turbot . . . . .	1,670	818	7,770	9,382
Halibut . . . . .	6,018	10,663	48,796	88,463
Lemon Soles . . . . .	11,252	9,079	74,227	63,163
Flounders . . . . .	556	505	3,426	4,444
Plaice . . . . .	9,087	12,924	53,203	61,809
Brill . . . . .	23	120	200	555
Dabs . . . . .	1,958	687	6,674	3,492
Witches . . . . .	486	1,827	4,193	18,757
Megrims . . . . .	1,326	1,188	17,775	17,520
Skates and Rays . . . . .	2,351	2,141	36,046	36,941
Unclassified kinds . . . . .	237	127	1,108	1,086
Totals . . . . .	178,136	149,027	1,553,951	2,508,079
Shell Fish:—				
Crabs . . . . .	585	559	9,747	11,269
Lobsters . . . . .	2,369	2,152	18,331	23,606
Oysters . . . . .	183	179	1,451	1,979
Clams . . . . .	44	47	910	878
Mussels . . . . .	960	704	6,246	4,991
Unclassified . . . . .	1,461	961	9,352	9,345
Total Value . . . . .	5,602	4,602	46,037	52,068
Total Value of all Fish . . . . .	183,738	153,629	1,599,988	2,560,147

NOTE.—Landed by Foreign Vessels during the Nine Months ended 30th September, 1915 (not included above), £445.

The above figures are subject to correction in the Board's Annual Report

STATEMENT of the TOTAL QUANTITY and VALUE of the FISH returned as landed on the IRISH COASTS during the Month and Nine Months ended 30th September, 1915, compared with the corresponding periods of the Year 1914.

Kinds of Fish.	September.		Nine Months ended 30th September.	
	1915.	1914.	1915.	1914.
QUANTITY.				
Brill, . . . . .	Cwt. 20	Cwt. 32	Cwt. 200	Cwt. 349
Soles, . . . . .	141	186	1,134	1,426
Turbot, . . . . .	44	56	269	438
Total Prime Fish, . . . . .	205	274	1,603	2,213
Cod, . . . . .	303	880	9,924	16,509
Conger Eel, . . . . .	227	441	2,412	3,686
Haddock, . . . . .	18	144	1,216	2,945
Hake, . . . . .	263	413	2,201	3,325
Herrings, . . . . .	34,904	22,956	222,656	241,714
Ling, . . . . .	47	132	1,247	2,955
Mackerel, . . . . .	4,194	6,452	83,649	138,757
Plaice, . . . . .	709	1,226	6,361	8,538
Ray or Skate, . . . . .	636	1,030	5,639	5,419
Sprats, . . . . .	5	—	92	80
Whiting, . . . . .	359	665	4,881	9,804
All other except Shell Fish, . . . . .	1,564	1,520	9,589	12,493
Total, . . . . .	43,434	36,133	351,470	448,438
Shell Fish :—	No.	No.	No.	No.
Crabs, . . . . .	10,702	7,769	88,721	136,443
Lobsters, . . . . .	30,350	27,327	218,087	396,183
Mussels, . . . . .	Cwt. 392	Cwt. 234	Cwt. 4,352	Cwt. 5,467
Oysters, . . . . .	No. 2,642	No. 2,744	No. 81,134	No. 150,053
Other Shell Fish, . . . . .	Cwt. 1,012	Cwt. 901	Cwt. 8,219	Cwt. 9,080
VALUE.				
Brill, . . . . .	£ 56	£ 63	£ 473	£ 845
Soles, . . . . .	877	829	5,367	6,164
Turbot, . . . . .	220	240	1,208	1,986
Total Prime Fish, . . . . .	953	1,132	7,048	8,995
Cod, . . . . .	684	1,101	10,756	13,838
Conger Eel, . . . . .	233	274	1,751	2,511
Haddock, . . . . .	40	129	1,259	2,615
Hake, . . . . .	540	530	3,791	4,247
Herrings, . . . . .	21,182	7,700	137,112	78,162
Ling, . . . . .	45	72	953	2,136
Mackerel, . . . . .	1,466	2,258	35,578	38,817
Plaice, . . . . .	1,283	1,525	9,317	9,956
Ray or Skate, . . . . .	388	425	2,564	2,494
Sprats, . . . . .	3	—	26	17
Whiting, . . . . .	480	657	5,262	5,567
All other except Shell Fish, . . . . .	1,151	706	6,551	6,467
Total, . . . . .	28,396	16,509	221,968	175,822
Shell Fish :—				
Crabs, . . . . .	65	75	649	794
Lobsters, . . . . .	972	710	8,165	13,260
Mussels, . . . . .	36	20	534	716
Oysters, . . . . .	5	4	163	235
Other Shell Fish, . . . . .	198	159	1,949	1,929
Total, . . . . .	1,276	968	11,460	16,934
Total Value of Fish landed, . . . . .	29,672	17,477	233,428	192,756

## EMIGRATION FROM IRELAND.

TABLE showing, by Destinations, the Numbers of Emigrants (Natives of Ireland) who left the Ports of Ireland during the Months of July, August and September, 1915, and the total for the Nine Months ended the 30th September, 1915, together with the total Number of Emigrants in each of the corresponding periods of the year, 1914.

DESTINATION.	July, 1915.	August, 1915.	September, 1915.	Nine Months ended 30th Sept., 1915.
<b>FOREIGN COUNTRIES AND THE COLONIES :—</b>				
America (U.S.), . . . . .	567	666	920	4,653
Canada, . . . . .	38	71	71	519
South Africa, . . . . .	—	6	8	46
Australia, . . . . .	29	30	31	277
New Zealand, . . . . .	—	20	2	47
Other Countries, . . . . .	—	1	6	15
<b>Total, . . . . .</b>	<b>634</b>	<b>794</b>	<b>1,038</b>	<b>5,557</b>
<b>GREAT BRITAIN :—</b>				
England and Wales, . . . . .	191	152	173	1,433
Scotland, . . . . .	179	188	162	582
<b>Total, . . . . .</b>	<b>370</b>	<b>340</b>	<b>335</b>	<b>2,015</b>
<b>General Total, 1915,</b>	<b>1,004</b>	<b>1,134</b>	<b>1,373</b>	<b>7,572</b>
<b>General Total, 1914,</b>	<b>1,208</b>	<b>1,029</b>	<b>1,911</b>	<b>17,057</b>

The figures in the above Table have been abstracted from the monthly Return published by the Registrar-General for Ireland.

*The figures are subject to revision in the Annual Report.*

MONTHLY AND QUARTERLY AVERAGE PRICES FOR IRELAND OF CROPS, LIVE STOCK, MEAT, PROVISIONS, &c., for the period ended 30th September, 1915.

PRODUCT.	MONTH.			QUARTER.	
	July.	August.	September	1915.	1914.
<b>CROPS :</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Wheat, .. per 112 lbs.	—	—	10 4	10 4	9 1½
Oats (White), ..	10 0	10 1	8 5	9 1	7 8½
„ (Black), ..	9 10	8 10	7 1	7 5	6 9
Barley, ..	—	—	9 5	9 5	7 6½
Potatoes, ..	4 10½	3 6½	3 5½	3 11½	4 1½
Hay (Clover), ..	4 0½	3 11½	4 5½	4 1½	3 5½
„ (Meadow) ..	3 8	3 8½	3 0½	3 4	2 9½
Grass Seed—					
(Perennial Rye), ..	—	8 10	11 10	11 8	6 3½
(Italian Rye), ..	—	—	17 0	17 0	7 4½
Flax, .. per 14 lbs.	—	—	16 8	16 8	9 5½
<b>LIVE STOCK :</b>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>
Calves (young), per head	3 8 9	4 1 6	3 15 9	3 15 9	2 7 9
Store Cattle—					
Over 6 and not exceeding 12 months, per head	7 0 0	6 19 9	6 16 9	6 18 9	5 2 9
One year old and under two years, per head	10 12 9	10 15 9	11 1 0	10 17 0	8 8 0
Two years old and under three years, per head	13 16 0	14 15 9	15 3 9	14 14 6	11 8 3
Three years old and over, per head	15 7 6	16 13 3	18 5 3	17 7 6	12 4 6
Fat Cattle—					
Two years old and under three years, per head	19 15 0	19 18 3	19 15 9	19 16 3	14 19 6
Three years old and over, per head	22 16 6	24 6 0	23 7 9	23 10 6	16 14 9
Cows and Bulls, ..	18 7 9	18 18 6	18 16 9	18 15 0	13 6 9
Springers—					
Cows and Heifers, ..	19 1 0	19 12 9	19 11 0	19 8 9	14 15 6
Milch Cows (down calved) per head	17 3 9	17 6 0	17 13 0	17 8 3	13 13 9
Lambs (under 12 months old), .. per head	1 13 6	1 14 6	1 15 6	1 14 6	1 6 9
Store Sheep—					
One year old and under two years, per head	1 19 3	2 0 0	2 4 9	2 3 0	1 12 6
Two years old and over, per head	1 15 0	2 3 6	2 10 6	2 9 3	1 16 9
Fat Sheep—					
One year old and under two years, per head	2 10 9	2 14 9	3 0 3	2 15 6	2 3 0
Two years old and over, per head	2 13 9	2 17 9	2 19 0	2 17 0	2 3 0
Young Pigs—					
8 to 10 weeks old, per head	1 13 0	1 15 0	1 17 0	1 15 3	1 6 0
Store Pigs—					
10 weeks to 4 months old, per head	1 18 0	1 19 6	2 1 6	3 0 3	1 10 0
4 months old and over, ..	2 12 6	2 11 9	2 13 0	2 12 6	1 17 6
Fat Pigs, ..	5 6 6	5 7 3	6 1 0	5 17 6	4 17 3
Sows, ..	7 10 9	7 13 9	9 8 0	8 7 0	6 9 9
<b>MEAT, PROVISIONS, &amp;c.</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Beef (Live), per 112 lbs.	54 0	54 3	50 3	52 9	36 3
„ (Dead), ..	94 6	95 0	88 0	92 3	63 6
Mutton (Live) ..	44 9	44 6	45 9	45 0	36 6
„ (Dead) ..	78 3	78 0	80 0	78 9	64 0
Pork (Dead) ..	74 6	80 6	81 0	78 9	60 6
Butter (Creamery), ..	138 9	150 0	158 3	148 3	116 7
„ (Factory) ..	122 9	129 3	136 3	128 9	97 10
„ (Farmers) ..	119 6	125 3	132 0	125 0	98 11



QUARTERLY AVERAGE PRICES FOR EACH PROVINCE, OF CROPS, LIVE STOCK, MEAT, PROVISIONS, &c., for the Quarter ended 30th September, 1915.

PRODUCT.	PROVINCE.			
	Leinster.	Munster.	Ulster.	Connaught.
<b>CROPS:</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Wheat, .. per 112 lbs.	10 4	—	—	—
Oats (White), .. "	8 8	8 4	9 8	9 0
" (Black), .. "	9 5	7 3	—	—
Barley, .. "	8 5	9 6	—	—
Potatoes, .. "	4 0	4 3½	3 4½	3 11½
Hay (Clover), .. "	5 10½	3 5½	4 8½	3 4½
" (Meadow), .. "	3 9½	3 0½	3 10½	3 1½
Grass Seed—				
(Perennial Rye), .. "	—	—	11 8	—
(Italian Rye), .. "	—	—	17 0	—
Flax, .. per 14 lbs.	—	—	16 8	—
<b>LIVE STOCK:</b>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>
Calves (young) .. per head	3 13 6	3 13 0	2 16 0	4 9 3
Store Cattle—				
Over 6 and not exceeding 12 months, .. per head	7 1 9	6 5 6	7 4 0	7 1 3
One year old and under two years, .. per head	11 17 6	10 10 0	10 6 3	10 18 0
Two years old and under three years, per head	16 11 9	13 14 6	13 3 0	15 1 0
Three years old and over, per head	19 18 6	14 4 9	—	19 4 6
Fat Cattle—				
Two years old and under three years, per head	20 19 3	19 16 6	19 0 0	19 17 0
Three years old and over, per head	23 18 0	22 2 3	26 8 0	23 19 6
Cows and Bulls, .. "	20 5 3	18 0 6	18 12 9	21 4 3
Springers—				
Cows and Heifers, per head	19 14 9	17 11 0	19 10 0	20 2 9
Milch Cows (down calved), .. "	17 13 3	15 17 6	18 0 9	16 16 9
Lambs (under 12 months old) per head	1 15 3	1 15 9	1 9 3	1 15 3
Store Sheep—				
One year old and under two years, .. per head	2 8 3	1 15 3	1 9 6	2 9 9
Two years old and over, per head	2 9 9	1 13 9	1 12 6	2 15 0
Fat Sheep—				
One year old and under two years, per head	2 13 3	2 17 0	2 10 0	2 19 6
Two years old and over, .. "	2 15 0	2 10 6	2 14 9	3 15 0
Young Pigs—				
8 to 10 weeks old per head	1 7 6	1 15 9	1 18 9	1 18 9
Store Pigs—				
10 weeks to 4 months old, per head	2 3 0	1 16 6	—	—
4 months old and over, .. "	2 14 9	2 11 9	—	—
Fat Pigs, .. "	5 5 9	5 7 6	—	6 10 0
Sows, .. "	8 5 0	9 0 0	7 11 9	11 10 0
<b>MEAT, PROVISIONS, &amp;c.</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Beef (Live), .. per 112 lbs.	52 9	—	—	—
" (Dead), .. "	92 3	—	—	—
Mutton (Live), .. "	45 0	—	—	—
" (Dead), .. "	78 9	—	—	—
Pork (Dead), .. "	73 9	79 6	74 0	76 3
Butter (Creamery), .. "	151 0	148 0	—	—
" (Factory), .. "	—	128 9	—	—
" (Farmers), .. "	126 0	125 3	113 9	124 3
Eggs, .. per 120	13 8	13 5	—	12 6

NUMBER OF ANIMALS included in Returns furnished under the MARKERS and FAIRS (Weighing of Cattle) Act, 1891, Sections 3 and 4, during the Quarter ended 30th September, 1915.

WEEK ENDED	FAT CATTLE.					FAT SHEEP.				
	Dublin.		Belfast.		Total Number of Cattle included in Returns.	Dublin.		Belfast.	Total Number of Sheep included in Returns.	
	Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.	Corporation Market Authorities.	Mr. John Robson, Auctioneer.		Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.			
1915.										
July 1 . . . . .	64	149	32	62	307	—	226	—	226	
" 8 . . . . .	68	136	32	45	282	—	377	—	377	
" 15 . . . . .	69	209	35	57	370	—	278	—	278	
" 22 . . . . .	63	153	32	58	306	—	362	—	362	
" 29 . . . . .	81	141	36	54	312	—	245	—	245	
August 5 . . . . .	63	146	34	47	290	—	360	—	360	
" 12 . . . . .	63	142	37	41	283	—	385	—	385	
" 19 . . . . .	77	153	34	60	324	—	301	—	301	
" 26 . . . . .	67	122	34	43	266	—	274	—	274	
September 2 . . . . .	47	121	27	83	278	—	317	—	317	
" 9 . . . . .	38	170	34	56	298	—	240	—	240	
" 16 . . . . .	44	188	31	42	305	—	286	—	286	
" 23 . . . . .	66	186	30	117	399	—	228	—	228	
" 30 . . . . .	52	206	30	64	352	—	349	—	349	
Totals.	862	2,222	453	830	4,372	—	4,228	—	4,228	

WEEKLY AVERAGE PRICES of WHEAT, OATS, and BARLEY, per 112 lbs.  
computed from Market Returns of certain quantities of these Cereals  
supplied by Officers of Customs and Excise, during the QUARTER  
ended 30th September, 1915.

Returns received in the Week ended	WHEAT.		OATS.		BARLEY.	
	Average Price per 112 lbs.	Quantity.	Average Price per 112 lbs.	Quantity.	Average Price per 112 lbs.	Quantity
1915.	s. d.	Cwts. of 112 lbs.	s. d.	Cwts. of 112 lbs.	s. d.	Cwts. of 112 lbs.
July 3	—	—	10 2	1,579	—	—
" 10	—	—	9 11	1,265	—	—
" 17	—	—	10 0	1,624	—	—
" 24	—	—	9 11	1,994	—	—
" 31	—	—	9 10	1,965	—	—
August 7	—	—	9 9	1,974	—	—
" 14	—	—	9 10	1,721	—	—
" 21	—	—	9 10	2,559	—	—
" 28	—	—	9 7	8,480	—	—
September 4	—	—	7 9	13,879	—	—
" 11	—	—	7 6	16,118	—	—
" 18	10 5	750	7 6	21,351	9 3	1,250
" 25	10 3	700	7 4	2,296	9 6	2,040

QUARTERLY AVERAGE PRICES of FAT CATTLE and FAT SHEEP, per 112 lbs., LIVE  
WEIGHT, sold in DUBLIN MARKETS during the period ended 30th  
September, 1915, and also for the corresponding period during eighteen  
preceding years.

Year.	Fat Cattle.	Fat Sheep.	Year.
£ s. d.		£ s. d.	
1915,	2 12 9	2 5 0	1915.
1914,	1 16 3	1 16 6	1914.
1913,	1 15 3	1 16 0	1913.
1912,	1 11 0	1 8 10	1912.
1911,	1 12 7	1 11 7	1911.
1910,	1 15 5	1 13 6	1910.
1909,	1 13 4	1 10 0	1909.
1908,	1 12 4	1 15 8	1908.
1907,	1 11 8	1 18 5	1907.
1906,	1 10 3	1 17 8	1906.
1905,	1 10 6	1 15 1	1905.
1904,	1 11 7	1 15 10	1904.
1903,	1 11 10	1 13 1	1903.
1902,	1 13 10	1 12 1	1902.
1901,	1 11 6	1 12 1	1901.
1900,	1 12 7	1 14 5	1900.
1899,	1 11 0	1 13 2	1899.
1898,	1 9 1	1 11 4	1898.
1897,	1 9 11	1 12 10	1897.

## BUTTER PRICES DURING THE QUARTER

ABSTRACTED FROM "THE GROCER," "GROCER'S REVIEW."

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the  
an Irish Creamery would be 5s. to 7s. per cwt. less than  
freight, commission,

COUNTRY OF ORIGIN	Type of Package.	Place of Sale.	WEEK ENDED				
			JULY.				
			3rd.	10th.	17th.	24th.	
IRELAND— Creamery Butter.	Kieis, kegs, or pyramid boxes	London, . . .	Per cwt. s. s. 140-146	Per cwt. s. s. 140-146	Per cwt. s. s. 140-146	Per cwt. s. s. 142-150	
		Liverpool, . . .	138-143	141-144	140-146	140-152	
		Bristol, . . .	142-147	142-148	144-148	146-150	
		Cardiff, . . .	144-147	145-147	144-148	145-150	
		Manchester, . . .	140-148	142-150	140-150	145-152	
		Birmingham, . . .	143-145	143-145	144-147	147-148	
		Glasgow, . . .	142-143	142-143	144-145	145-147	
		Limerick, . . .	—	—	—	—	
		Cork, . . .	—	—	—	—	
		Belfast, . . .	—	—	—	—	
		Dublin, . . .	140-142	140-142/4	142-144	144/8	
		F.O.R., . . .	144/8-149/4	144/8-149/4	149/4-154	154-158/8	
	Factories,	1lb. rolls, in boxes, Salted or Unsalted.	London, . . .	126-134	126-134	124-132	126-136
			Liverpool, . . .	126-128	—	126-130	126-130
			Bristol, . . .	126-134	130-134	128-132	128-132
			Cardiff, . . .	132-134	132-134	132-134	132-136
	Farmers' Butter,	Firkins 1st, Export Price Do. 2nd " Do. 3rd " Fresh, . . .	Cork, . . .	121-124	120-121	120-122	122-126
			Cork, . . .	116-121	114-119	117-119	117-119
			Cork, . . .	112	—	—	—
			Cork, . . .	125	125	125	125-128
	FRANCE,	12x21b. rolls,	London, . . .	Per doz. lbs. 13/6-16/-	Per doz. lbs. 13/6-16/-	Per doz. lbs. 13/6-16/-	Per doz. lbs. 13/6-16/-
Paris baskets, do., . . .		do., . . .	Per cwt. 136-144	Per cwt. 135-144	Per cwt. 135-144	Per cwt. 135-144	
DENMARK AND SWEDEN	Kieis, . . .	Copenhagen Quotation, { 127 Kr. 143/7 per per =per 50 cwt. Kilos/	130 Kr. 147/9 per per =per 50 cwt. Kilos/	132 Kr. 150/3 per per =per 50 cwt. Kilos/	136 Kr. 150/5 per per =per 50 cwt. Kilos/		
		Average over- price, London, . . .	150-154	155-158	157-160	162-166	
		Liverpool, . . .	150-158	157-161	157-162	158-168	
		Bristol, . . .	—	—	—	—	
		Cardiff, . . .	160	163	164	166	
		Manchester, . . .	153-158	155-160	157-162	158-164	
		Birmingham, . . .	154-156	156-158	158-160	160-162	
		Newcastle-on- Tyne, . . .	152-157	153-158	154-159	156-165	
		Glasgow, . . .	152-153	155	158-160	160-162	
		Leith, . . .	153/6	156	157	160	
		Hull, . . .	146-153	154-156	160-163	165-166	
		F.O.R. Lon- don	—	—	—	—	
FINLAND	Kieis, . . .	Manchester, . . .	145-150	146-151	147-154	150-156	
		Liverpool, . . .	—	—	—	—	
		Hull, . . .	140-148	141-142	149-150	142-148	
		Cardiff, . . .	—	—	—	—	

ENDED 30TH SEPTEMBER, 1915.

## "GROCER'S GAZETTE," AND OTHER TRADE REPORTS.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

WEEK ENDED								
AUGUST.					SEPTEMBER.			
31st.	7th.	14th.	21st.	28th.	4th.	11th.	18th.	25th.
Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.
148-164	150-166	154-160	156-162	154-160	152-156	157-164	164-170	172-178
141-156	149-160	152-159	153-157	150-156	148-157	154-160	160-168	170-182
150-154	152-158	156-164	160-164	160-164	158-164	160-164	164-167	172-178
150-158	154-160	156-164	160-164	152-162	154-160	158-164	162-171	180-182
148-156	154-160	158-165	158-165	155-163	153-159	156-162	164-170	172-178
152-153	156-168	160-162	160-162	157-159	154-157	158-161	166-168	174-176
149-152	155-157	162-163	163-164	157-159	157-159	159-160	167-168	174-176
—	—	—	—	—	—	—	—	—
148-149/4	151/8-154	156-158/8	156-158/8	154-158	152-154	155-156	158/8-163/4	172/8
154-158/8	158/8	158/8	158/8-163	158/8-168	158/8-177/4	163/4-177/4	172/8-177/4	182-186/8
127-142	127-145	129-146	129-146	129-148	129-150	133-150	133-153	138-159
126-130	126-130	128-132	130-134	130-134	130-134	132-138	133-140	140-142
130-136	130-138	132-138	132-138	132-138	132-138	132-142	136-144	138-156
134-136	135-138	135	146-148	138-148	141	140-142	140-148	140-150
126-131	129-132	130-135	130-131	131-132	131-133	133-136	136-139	141-142
119-122	122-125	124-127	123-125	123-124	123-125	125-134	130-132	132-134
112	—	119	133	120	119	117	—	126
128	130-133	133-134	—	133	133-134	134-137	137-140	141
Per doz. lbs. 13/6-16	Per doz. lbs. 14-16/6	Per doz. lbs. 14-16/6	Per doz. lbs. 14-16/6	Per doz. lbs. 14-16/6	Per doz. lbs. 14/6-17	Per doz. lbs. 14/6-17	Per doz. lbs. 15-17	Per doz. lbs. 15-17
Per cwt. 135-144	Per cwt. 139-148	Per cwt. 139-148	Per cwt. 139-148	Per cwt. 139-148	Per cwt. 143-152	Per cwt. 143-152	Per cwt. 147-156	Per cwt. 147-156
138 Kr. 154/1 per 50 Kilos	143 Kr. 159/5 per 50 Kilos	143 Kr. 159/10 per 50 Kilos	140 Kr. 157/9 per 50 Kilos	137 Kr. 154/4 per 50 Kilos	140 Kr. 159/— per 50 Kilos	144 Kr. 162/7 per 50 Kilos	149 Kr. 163/8 per 50 Kilos	157 Kr. 176/10 per 50 Kilos
164-168	170-174	170-174	169-172	165-169	165-168	170-172	178-181	190-194
162-169	165-174	168-175	168-174	166-172	163-169	167-173	170-186	176-194
167	170	176	179	173	170-172	170	180	190
164-170	166-173	170-175	170-176	166-173	164-168	168-172	177-183	183-189
165-168	168-170	170-173	170-173	166-170	165-168	169-172	178-179	185-187
161-164	164-172	168-172	164-171	164-167	162-168	166-177	174-186	183-193
164-166	167-169	172-174	174-176	170-172	166-168	169-170	178-179	182-184
166	167/6-168	171	172	167/6	164/8	168	178	186
166	168-170	168-170	—	—	166-168	166-170	173-175	190-195
152-160	157-162	157-164	153-164	156-163	153-168	158-162	162-170	172-178
156	154-160	152-160	146-150	149-150	149-151	150-152	168-170	178-182

[Continued on pages 192 and 193.]

**BUTTER PRICES DURING THE QUARTER**  
**ABSTRACTED FROM "THE GROCER," "GROCER'S REVIEW,"**

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the  
 an Irish Creamery would be 5s. to 7s. per cwt. less than  
 freight, commission,

COUNTRY OF ORIGIN.	Type of Package.	Place of Sale.	WEEK ENDED.			
			JULY			
			3rd.	10th.	17th.	24th.
RUSSIA AND SIBERIA,	Kieis,	London,	Per cwt. s. s. 128-132	Per cwt. s. s. 128-132	Per cwt. s. s. 128-132	Per cwt. s. s. 128-132
		Liverpool,	134-136	134-136	126-136	126-136
		Bristol,	132-138	130-136	132-138	132-138
		Cardiff,	—	134-138	129-135	130-136
		Manchester,	130-136	132-136	132-136	131-136
		Birmingham,	132-135	132-135	132-135	132-136
		Glasgow,	132	132	132	132-136
		Leith,	—	—	—	—
HOLLAND,	Boxes,	London,	—	—	—	—
	Rolls,	do.,	Per doz. lbs. 16/6-17	Per doz. lbs. 17-17/6	Per doz. lbs. 17-17/6	Per doz. lbs. 17-17/6
	Boxes,	Glasgow,—	Per cwt.	Per cwt.	Per cwt.	Per cwt.
		Fresh,	—	—	—	—
		Salt,	—	—	—	—
ITALY,	Rolls,	Manchester,	146-147	154-158	—	164-165
		Hull,	—	—	—	—
CANADA,	50 lb. Boxes,	London,	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
		Liverpool,	—	—	—	—
AUSTRALIA AND NEW ZEALAND,*	Boxes,	Bristol,	Per cwt.	Per cwt.	Per cwt.	Per cwt.
		Cardiff,	—	—	—	—
		Birmingham,	—	—	—	—
		Manchester,	—	—	—	—
		Glasgow,	—	—	—	—
		London,	A.s.138-140 u.138-140	A.s.138-140 u.138-140	A.s.138-140 u.138-140	A.s.138-140 u.138-140
		Liverpool,	Z. 144-146	Z. —	Z. —	Z. —
		Bristol,	Z. 144-145	Z. —	Z. 142-144	Z. 142-144
ARGENTINA,	Boxes,	Cardiff,	A. 140	A. 140	Z. 147-149	A. 147-149
		Manchester,	Z. 150-152	Z. —	A. 140-142	Z. —
		Birmingham,	A. 144	Z. —	Z. —	A. —
		Glasgow,	A. —	Z. —	A. —	Z. —
		Leith,	A. —	Z. —	A. —	Z. —
		Hull,	A. —	Z. —	A. —	Z. —
		London,	—	140-142	142-144	140-144
		Liverpool,	—	—	—	—
UNITED STATES,	Tubs and boxes,	Bristol,	—	—	—	—
		Cardiff,	—	—	—	—
		Birmingham,	—	—	—	—
		Manchester,	—	—	—	—
		Glasgow,	—	—	—	—

ENDED 30 TH SEPTEMBER, 1915—Continued.

"GROCER'S GAZETTE," AND OTHER TRADE REPORTS.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

[illegible]

## TABLES SHOWING THE EXPORTS

## TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT  
the PORTS OF EMBARKATION

PORTS IN IRELAND.	CATTLE.							SHEEP.			
	Fat.	Stores (fatten- ing).	Milch Cows.	Spring- ers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ballina, . . .	119	20	—	—	277	—	416	252	—	3,541	3,793
Belfast, . . .	10,787	24,575	1,984	2,295	101	—	39,742	—	6	14,202	14,208
Cork, . . .	5,313	8,319	925	828	100	1,960	17,443	467	5,033	8,708	14,203
Drogheda, . . .	2,085	180	74	—	—	—	2,339	2,660	—	409	3,069
Dublin, . . .	63,197	17,012	8,243	226	111	1,242	90,031	48,236	—	80,579	128,815
Dundalk, . . .	3,511	5,054	515	114	—	—	9,194	9,732	96	22,162	31,990
Greenore, . . .	356	1,385	805	316	—	—	2,895	1,577	—	18	1,595
Larne, . . .	197	4,174	1	11	—	31	4,414	501	314	611	1,426
Limerick, . . .	45	—	—	—	17	—	62	—	—	—	—
Londonderry, . . .	2,558	13,560	468	642	876	271	18,375	626	3,504	14,346	18,476
Milford, . . .	—	1	2	—	—	—	2	—	—	—	—
Mulroy, . . .	—	—	—	—	—	—	1	—	—	—	—
Newry, . . .	217	2,096	12	—	—	—	2,925	2,336	817	10,664	13,817
Portrush, . . .	—	20	—	—	—	—	20	—	—	—	—
Sligo, . . .	645	177	—	—	—	4	826	257	—	4,926	5,183
Waterford, . . .	7,956	8,923	1	25	16	600	17,526	5,362	—	9,099	14,461
Westport, . . .	39	—	—	—	245	—	284	8	—	—	8
<b>TOTAL.</b>	<b>97,055</b>	<b>86,101</b>	<b>13,036</b>	<b>4,457</b>	<b>1,743</b>	<b>4,108</b>	<b>206,500</b>	<b>72,014</b>	<b>9,770</b>	<b>169,265</b>	<b>251,049</b>

## TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT  
the PORTS OF DEBARKATION

PORTS IN GREAT BRITAIN.	CATTLE.							SHEEP.			
	Fat.	Stores (fatten- ing).	Milch Cows.	Spring- ers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ardrossan, . . .	—	—	—	—	—	—	—	—	—	—	—
Ayr, . . .	2,169	14,682	143	386	—	—	17,380	475	170	522	1,167
Barrow, . . .	—	—	—	—	—	—	—	—	—	—	—
Bristol, . . .	590	4,565	222	185	—	1,119	6,681	1,395	1,390	1,802	4,587
Cardiff, . . .	—	—	—	—	—	—	—	—	—	—	—
Dover, . . .	—	—	—	—	—	—	—	—	—	—	—
Falmouth, . . .	—	—	—	—	—	—	—	—	—	—	—
Fishguard, . . .	2,146	8,544	500	542	—	1,262	12,994	2,198	3,434	8,263	13,895
Flewood, . . .	528	803	732	216	9	—	2,288	—	—	7,532	7,532
Glasgow, . . .	18,313	18,683	1,799	1,925	1,663	855	45,623	409	62	4,800	5,271
Greenock, . . .	3,169	6,006	21	69	—	20	9,393	30	—	64	84
Heysham, . . .	4,916	10,137	3,816	459	5	60	19,393	2,341	3,015	8,704	14,060
Holyhead, . . .	15,709	6,625	3,271	415	—	574	26,594	16,617	—	21,265	37,882
Liverpool, . . .	38,012	11,534	2,235	248	62	186	55,277	40,387	1,549	105,496	147,432
London, . . .	—	—	—	—	—	—	—	—	—	—	—
Manchester, . . .	7,164	—	1	—	—	1	7,166	6,769	—	10,029	16,798
Newhaven, . . .	—	—	—	—	—	—	—	—	—	—	—
Plymouth, . . .	—	—	—	—	—	—	—	—	—	—	—
Preston, . . .	521	60	291	1	—	—	873	1,352	—	566	1,918
St. Ith, . . .	2,141	520	4	—	—	—	2,665	25	—	14	39
Southampton, . . .	—	—	—	—	—	—	—	—	—	—	—
Stranraer, . . .	177	4,057	1	11	—	31	4,277	26	150	218	394
Swansea, . . .	—	—	—	—	—	—	—	—	—	—	—
<b>TOTAL.</b>	<b>97,055</b>	<b>86,101</b>	<b>13,036</b>	<b>4,457</b>	<b>1,743</b>	<b>4,108</b>	<b>206,500</b>	<b>72,014</b>	<b>9,770</b>	<b>169,265</b>	<b>251,049</b>



## AND IMPORTS OF ANIMALS.

## I.

BRITAIN during the Three Months ended 30TH SEPTEMBER, 1915, showing  
IN IRELAND.

PIGS.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN IRELAND.
Fat.	Stores.	Total.		Stal- lions.	Mares.	Geld- ings.	Total.				
78	—	78	3	—	—	—	—	—	—	4,290	Ballina.
179	388	567	3	7	262	471	740	—	29	55,289	Belfast.
2,639	1	2,640	1	—	109	114	223	—	7	34,527	Cork.
171	78	249	4	—	1	1	1	—	—	5,662	Drogheda.
5,788	—	5,788	13	116	595	494	1,205	1	—	225,854	Dublin.
2,291	31	2,322	606	1	17	13	31	1	71	44,215	Dundalk.
265	74	339	13	—	153	176	329	—	202	5,373	Greenore.
3	215	218	—	2	9	37	48	—	1	6,107	Larne.
—	—	—	—	—	—	—	—	—	—	62	Limerick.
175	13	188	3	—	20	23	43	—	1	37,086	Londonderry.
37	—	37	—	—	1	—	1	—	—	40	Millford.
39	—	39	—	—	—	—	—	—	—	40	Mulroy.
157	—	157	53	—	4	5	9	—	2	16,963	Newry.
48	—	48	—	—	—	—	—	—	—	68	Portrush.
2,460	—	2,460	9	—	—	—	—	—	—	8,478	Silfro.
3,113	124	3,237	4	4	98	126	228	—	—	35,456	Waterford.
1	—	1	—	—	—	—	—	—	—	293	Westport.
17,444	924	18,368	712	130	1,269	1,459	2,858	2	314	479,803	TOTAL.

## II.

BRITAIN during the Three Months ended 30TH SEPTEMBER, 1915, showing  
IN GREAT BRITAIN.

PIGS.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN GREAT BRITAIN.
Fat.	Stores.	Total.		Stal- lions.	Mares.	Geld- ings.	Total.				
—	—	—	—	—	25	63	88	—	—	88	Ardrossan.
44	387	431	—	2	6	12	20	—	—	18,998	Ayr.
236	—	236	—	—	33	34	67	—	5	11,576	Barrow.
—	—	—	—	—	—	—	—	—	—	—	Bristol.
—	—	—	—	—	—	—	—	—	—	—	Cardiff.
—	—	—	—	—	—	—	—	—	—	—	Dover.
2,004	—	2,004	—	4	106	123	233	—	—	29,131	Falmouth.
—	1	1	2	—	66	143	209	—	1	10,033	Fishguard.
1,452	4	1,456	4	—	78	138	216	—	2	50,572	Fleetwood.
—	—	—	—	—	—	—	—	—	—	—	Glasgow.
—	—	—	—	2	4	4	10	—	—	9,383	Greenock.
967	10	977	—	6	99	145	260	—	—	34,680	Heysham.
4,006	74	4,080	19	112	623	509	1,249	—	202	70,016	Holyhead.
8,715	233	8,948	687	2	173	193	373	2	103	210,822	Liverpool.
—	—	—	—	—	—	—	—	—	—	—	London.
2	—	2	—	—	6	9	15	—	—	23,981	Manchester.
—	—	—	—	—	—	—	—	—	—	—	Newhaven.
—	—	—	—	—	24	16	40	—	—	40	Plymouth.
18	—	18	—	—	1	3	4	—	—	2,813	Preston.
—	—	—	—	—	—	3	3	—	—	2,707	Silloth.
—	—	—	—	—	11	17	28	—	—	28	Southampton.
—	215	215	—	2	9	37	48	—	1	4,935	Stranraer.
—	—	—	—	—	—	—	—	—	—	—	Swansea.
17,444	92	18,368	712	130	1,269	1,459	2,858	2	314	479,803	TOTAL.

TABLE

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from GREAT  
the PORTS OF

PORTS IN IRELAND.	CATTLE.							SHEEP.			
	Fat.	Stores	Milch Cows.	Spring- ers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ballina, . . .	—	—	—	—	—	—	—	—	—	—	—
Belfast, . . .	—	11	—	—	10	—	21	14	2,337	2	2,353
Coleraine, . . .	—	—	—	—	—	—	—	—	—	—	—
Cork, . . .	—	2	2	—	—	—	4	—	51	—	51
Drogheda, . . .	—	—	—	—	—	—	—	—	—	—	—
Dublin, . . .	—	11	7	—	—	8	26	—	2,081	—	2,081
Dundalk, . . .	—	—	—	—	—	—	—	—	—	—	—
Greenore, . . .	—	—	—	—	—	—	—	—	—	—	—
Larne, . . .	—	16	—	—	—	1	17	—	1,527	—	1,527
Limerick, . . .	—	—	—	—	—	—	—	—	—	—	—
Londonderry, . . .	—	13	—	—	—	1	14	—	167	1,631	1,798
Milford, . . .	—	—	—	—	—	—	—	—	—	—	—
Mulroy, . . .	—	—	—	—	—	—	—	—	—	—	—
Newry, . . .	—	—	—	—	—	—	—	—	—	185	185
Portrush, . . .	—	—	—	—	—	—	—	—	—	—	—
Silgo, . . .	—	—	—	—	—	—	—	—	—	—	—
Waterford, . . .	—	—	—	—	—	—	—	—	2	—	2
Westport, . . .	—	—	—	—	—	—	—	—	—	—	—
Wexford, . . .	—	—	—	—	—	—	—	—	—	—	—
TOTAL, . . .	—	53	9	—	10	10	82	14	6,165	1,818	7,997

TABLE

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from GREAT  
the PORTS OF EMBARKATION

PORTS IN GREAT BRITAIN.	CATTLE.							SHEEP.			
	Fat.	Stores	Milch Cows.	Spring- ers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Androssan, . . .	—	—	—	—	—	—	—	—	—	—	—
Ayr, . . .	—	15	—	—	4	—	19	14	2,824	—	2,838
Barrow, . . .	—	—	—	—	—	—	—	—	—	—	—
Bristol, . . .	—	—	—	—	—	—	—	—	1	—	1
Cardiff, . . .	—	—	—	—	—	—	—	—	—	—	—
Falmouth, . . .	—	2	—	—	—	—	2	—	—	—	—
Fishguard, . . .	—	2	2	—	—	—	4	—	4	—	4
Fleetwood, . . .	—	—	—	—	3	—	3	—	—	2	2
Glasgow, . . .	—	1	—	—	—	—	1	—	940	566	1,506
Greenock, . . .	—	12	—	—	—	1	13	—	11	1,250	1,261
Heysham, . . .	—	—	—	—	—	—	—	—	2	—	2
Holyhead, . . .	—	9	7	—	—	1	17	—	61	—	61
Liverpool, . . .	—	—	—	—	3	2	5	—	6	—	6
London, . . .	—	—	—	—	—	—	—	—	—	—	—
Manchester, . . .	—	—	—	—	—	—	—	—	—	—	—
Newhaven, . . .	—	—	—	—	—	—	—	—	—	—	—
Plymouth, . . .	—	—	—	—	—	—	—	—	—	—	—
Preston, . . .	—	—	—	—	—	—	—	—	—	—	—
Silloth, . . .	—	—	—	—	—	5	5	—	1,387	—	1,387
Southampton, . . .	—	—	—	—	—	—	—	—	—	—	—
Stranraer, . . .	—	12	—	—	—	1	13	—	925	—	925
Swansea, . . .	—	—	—	—	—	—	—	—	—	—	—
TOTAL, . . .	—	53	9	—	10	10	82	14	6,165	1,818	7,997

## III.

BRITAIN during the Three Months ended 30TH SEPTEMBER, 1915, showing  
DEBARKATION IN IRELAND.

PIGS.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN IRELAND.
Fat.	Stores.	Total.		Stal- lions.	Mares.	Geld- ings.	Total.				
—	—	—	—	—	—	—	—	—	—	—	Ballina.
—	—	—	1	18	56	46	120	—	—	2,495	Belfast.
—	—	—	—	—	—	—	—	—	—	—	Coleraine.
—	5	5	—	55	142	61	258	—	—	318	Cork.
—	—	—	—	—	—	—	—	—	—	—	Drogheda.
—	8	8	1	199	335	94	628	—	1	2,745	Dublin.
—	—	—	—	—	2	1	3	—	—	3	Dundalk.
—	—	—	—	1	45	86	132	—	—	132	Greenore.
—	—	—	—	3	13	6	22	—	—	1,566	Larne.
—	—	—	—	—	—	—	—	—	—	—	Limerick.
—	—	—	—	1	14	15	30	—	—	1,842	Londonderry.
—	—	—	—	—	—	—	—	—	—	—	Millford.
—	—	—	—	—	—	—	—	—	—	—	Mulroy.
—	1	1	—	—	2	—	2	—	—	3	Newry.
—	—	—	—	—	2	—	2	—	—	187	Portrush.
—	—	—	—	—	—	—	—	—	—	—	Sligo.
—	3	3	1	3	57	78	138	—	—	144	Waterford.
—	—	—	—	—	—	—	—	—	—	—	Westport.
—	—	—	—	—	—	—	—	—	—	—	Wexford.
—	17	17	3	280	668	387	1,335	—	1	9,435	TOTAL.

## IV.

BRITAIN during the Three Months ended 30TH SEPTEMBER, 1915, showing  
IN GREAT BRITAIN.

PIGS.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN GREAT BRITAIN.
Fat.	Stores.	Total.		Stal- lions.	Mares.	Geld- ings.	Total.				
—	—	—	—	—	1	—	1	—	—	7	Ardrossan.
—	—	—	—	5	12	4	21	—	—	2,374	Ayr.
—	—	—	—	15	70	25	110	—	—	111	Barrow.
—	—	—	—	—	—	—	—	—	—	—	Bristol.
—	—	—	—	—	—	—	—	—	—	2	( Cardiff.
—	—	—	—	—	—	—	—	—	—	—	Falmouth.
—	—	—	1	40	112	111	263	—	—	272	Fishguard.
—	—	—	—	5	21	29	55	—	—	63	Fleetwood.
—	0	6	1	7	21	17	45	—	—	1,558	Glasgow.
—	—	—	—	4	7	6	17	—	—	1,291	Greenock.
—	—	—	—	2	6	5	13	—	—	15	Heysham.
—	1	1	—	195	372	172	739	—	1	820	Holyhead.
—	10	10	1	1	19	10	30	—	—	51	Liverpool.
—	—	—	—	—	—	—	—	—	—	—	London.
—	—	—	—	—	—	—	—	—	—	—	Manchester.
—	—	—	—	—	—	—	—	—	—	—	Newhaven.
—	—	—	—	3	15	1	19	—	—	19	Plymouth.
—	—	—	—	—	—	—	—	—	—	—	Preston.
—	—	—	—	—	—	1	1	—	—	1,393	Silloth.
—	—	—	—	—	—	—	—	—	—	—	Southampton.
—	—	—	—	3	12	6	21	—	—	959	Stranraer.
—	—	—	—	—	—	—	—	—	—	—	Swansea.
—	17	17	3	280	668	387	1,335	—	1	9,435	TOTAL.

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the  
showing the PORTS of

PORT IN IRELAND.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
BELFAST, .	—	67	—	—	67	—	—	—
DUBLIN, .	118	23	—	—	141	62	—	62
TOTAL, .	118	90	—	—	208	62	—	62

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the  
showing the PORTS of DEBARKATION

PORT IN ISLE OF MAN.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
DOUGLAS, .	118	90	—	—	208	62	—	62

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the  
showing the PORTS of

PORT IN IRELAND.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
BELFAST, .	—	—	—	—	—	—	—	—
DUBLIN, .	—	—	—	—	—	—	—	—
TOTAL, .	—	—	—	—	—	—	—	—

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the  
showing the PORTS of EMBARKATION

PORT IN ISLE OF MAN.	CATTLE					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
DOUGLAS, .	—	—	—	—	—	—	—	—

ISLE OF MAN during the Three Months ended 30th September, 1915,  
EMBARKATION in IRELAND.

SWINE.			Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	PORT IN IRELAND.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	—	—	—	—	—	67	BELFAST.
—	—	—	—	—	—	—	—	—	—	203	DUBLIN.
—	—	—	—	—	—	—	—	—	—	270	TOTAL

ISLE OF MAN during the Three Months ended 30th September, 1915,  
in the ISLE OF MAN.

SWINE.			Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	PORT IN ISLE OF MAN.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	—	—	—	—	—	270	DOUGLAS.

ISLE OF MAN during the Three Months ended 30th September, 1915,  
DEBARKATION in IRELAND.

SWINE.			Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	PORT IN IRELAND.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	1	—	1	—	—	1	BELFAST.
—	—	—	—	—	1	—	1	—	—	1	DUBLIN.
—	—	—	—	—	1	—	1	—	—	1	TOTAL

ISLE OF MAN during the Three Months ended 30th September, 1915,  
in the ISLE OF MAN.

SWINE.			Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	PORT IN ISLE OF MAN.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	1	—	1	—	—	1	DOUGLAS.

## COASTING AND

RETURN OF THE NUMBER OF ANIMALS SHIPPED to and from Places in  
the Places of Embarkation

IRISH PORTS.	CATTLE.					SHEEP.			SWINE.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.	Fat.	Stores.	Total.
Cork to Aghada Pier, .	—	—	—	—	—	—	—	—	—	—	—
" to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
" to Spike Island, .	—	—	—	—	—	—	—	—	—	—	—
" to Queenstown, .	—	—	—	—	—	—	—	—	—	—	—
" to Waterford, .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	—	—	—	—	—	—	—	—	—	—
Aghada Pier to Cork, .	—	—	—	—	—	—	—	—	—	—	—
Belfast " .	—	—	—	—	—	—	—	—	—	—	—
Spike Island " .	—	—	—	—	—	—	—	—	—	—	—
Queenstown " .	—	—	—	—	—	—	—	—	—	—	—
Waterford " .	—	—	—	—	—	—	1	1	—	—	—
Total, .	—	—	—	—	—	—	1	1	—	—	—
Waterford to Ballyhack, .	—	—	—	—	—	—	—	—	—	—	—
" to Belfast, .	—	71	—	6	77	—	—	—	1	—	1
" to Duncannon .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	71	—	6	77	—	—	—	1	—	1
Ballyhack to Waterford, .	31	—	—	—	31	56	28	84	44	—	44
Dublin to Belfast, .	99	—	—	—	99	562	7	569	—	—	—
Duncannon to Waterford, .	83	60	—	—	143	167	—	167	118	—	118
Kilrush to Limerick, .	—	23	—	—	23	—	—	—	577	—	577
Kildysart " .	—	—	—	—	—	—	—	—	—	—	—
Glin, " .	—	—	—	—	—	—	—	—	—	—	—
Portumna, " .	—	—	—	—	—	—	—	—	—	—	—
Tarbert, " .	—	—	—	—	—	—	—	—	—	—	—
Kilkee, " .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	23	—	—	23	—	—	—	577	—	577
Milford to Portrush, .	—	—	—	—	—	—	—	—	—	4	4
Belfast to Dublin, .	—	—	—	—	—	8	—	8	—	—	—
Londonderry to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Moville to Londonderry, .	—	45	—	—	45	—	—	—	—	—	—
Ballina to Sligo, .	—	—	—	—	—	20	—	20	—	—	—
Belmullet " .	15	—	—	—	15	28	170	198	791	—	791
Westport " .	—	—	—	—	—	—	—	—	—	—	—
Total, .	15	—	—	—	15	48	170	218	791	—	791
Sligo to Belmullet, .	—	—	—	—	—	—	6	6	19	—	19
Milford to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Mulroy to Milfori, .	—	—	—	—	—	—	—	—	—	—	—
Dublin to Waterford, .	—	—	—	—	—	—	—	—	—	—	—
Leitbeg to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Total, .	223	199	—	6	433	841	212	1,053	1,550	4	1,554

## INLAND NAVIGATION.

Ireland during the Three Months ended 30TH SEPTEMBER, 1915, showing  
and Debarkation.

Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	IRISH PORTS.
	Stallions.	Mares.	Geldings.	Total.				
—	—	—	—	—	—	—	—	Cork to Aghada Pier.
—	—	—	—	—	—	—	—	" to Belfast.
—	—	—	—	—	—	—	—	" to Spike Island.
—	—	—	—	—	—	—	—	" to Queenstown.
—	—	—	—	—	—	—	—	" to Waterford.
—	—	—	—	—	—	—	—	Total.
—	—	—	—	—	—	—	—	Aghada Pier to Cork.
—	—	—	—	—	—	—	—	Belfast " "
—	—	—	—	—	—	—	—	Spike Island " "
—	—	—	—	—	—	—	1	Queenstown " "
—	—	—	—	—	—	—	1	Waterford " "
—	—	—	—	—	—	—	1	Total.
—	—	—	—	—	—	—	—	Waterford to Ballyhack.
—	—	1	—	1	—	—	79	" to Belfast.
—	—	—	—	—	—	—	—	" to Duncannon.
—	—	1	—	1	—	—	79	Total.
—	—	—	—	—	—	—	159	Ballyhack to Waterford.
—	—	—	4	4	—	—	672	Dublin to Belfast.
—	—	—	—	—	—	—	428	Duncannon to Waterford.
—	—	—	—	—	—	—	600	Kilrush to Limerick.
—	—	—	—	—	—	—	—	Kildysart " "
—	—	—	—	—	—	—	—	Glin " "
—	—	—	—	—	—	—	—	Portumna " "
—	—	—	—	—	—	—	—	Tarbert " "
—	—	—	—	—	—	—	—	Kilkee " "
—	—	—	—	—	—	—	600	Total.
—	—	—	—	—	—	—	4	Millford to Portrush.
—	—	—	1	1	—	—	9	Belfast to Dublin.
—	—	—	—	—	—	—	—	Londonderry to Mulroy.
—	—	—	—	—	—	—	45	Moville to Londonderry.
—	—	—	—	—	—	—	20	Ballina to Sligo.
—	—	—	—	—	—	—	1,004	Belmullet " "
—	—	—	—	—	—	—	—	Westport " "
—	—	—	—	—	—	—	1,024	Total.
—	—	—	—	—	—	—	25	Sligo to Belmullet.
—	—	—	—	—	—	—	—	Millford to Mulroy.
—	—	—	—	—	—	—	—	Mulroy to Millford.
—	—	1	—	1	—	—	1	Dublin to Waterford.
—	—	—	—	—	—	—	—	Leitbeg to Mulroy.
—	—	2	5	7	—	—	3,047	Total.

RETURN of the NUMBER of HORSES EXPORTED from IRELAND through GREAT BRITAIN to the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 30TH SEPTEMBER, 1915, showing the Ports of Embarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast, . . . . .	—	—	—	—
Cork, . . . . .	—	—	—	—
Dublin, . . . . .	—	—	—	—
Dundalk, . . . . .	—	—	—	—
Greenore, . . . . .	—	—	—	—
Waterford, . . . . .	—	—	—	—
Wexford, . . . . .	—	—	—	—
Total, . . . . .	—	—	—	—

RETURN of the NUMBER of HORSES IMPORTED into IRELAND through GREAT BRITAIN from the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 30TH SEPTEMBER, 1915, showing the Ports of Debarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast, . . . . .	—	—	—	—
Dublin, . . . . .	—	—	—	—
Total, . . . . .	—	—	—	—

RETURN of the NUMBER of HORSES EXPORTED from IRELAND direct to FOREIGN COUNTRIES during the THREE MONTHS ended 30TH SEPTEMBER, 1915, showing the Ports of Embarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Cork, . . . . .	—	—	—	—
Limerick, . . . . .	—	—	—	—
Total, . . . . .	—	—	—	—



## DISEASES OF ANIMALS IN IRELAND.

NUMBER OF OUTBREAKS of SWINE FEVER, and NUMBER of SWINE returned as having been SLAUGHTERED in Ireland, under the Diseases of Animals Act of 1894, in the undermentioned period, by Order of the Department.

Quarter ended	SWINE FEVER.	
	Outbreaks confirmed.	Swine Slaughtered as Diseased or as having been Exposed to Infection.
30th September, 1915,	57	291

NUMBER of OUTBREAKS reported as having taken place, and NUMBER of ANIMALS returned as having been Attacked by ANTHRAX, GLANDERS and FOOT AND MOUTH DISEASE in Ireland in the undermentioned period.

Quarter ended	ANTHRAX.		GLANDERS (including Farcy)		Foot and Mouth Disease.	
	Outbreaks Reported.	Animals Attacked.	Outbreaks Reported.	Animals Attacked.	Outbreaks Reported.	Animals Attacked.
30th Sept., 1915,	—	—	—	—	—	—

NUMBER of CASES of RABIES in DOGS in IRELAND during the undermentioned period.

Quarter ended	Number of Cases.
30th September, 1915,	—

NUMBER of OUTBREAKS reported as having taken place, and NUMBER of ANIMALS returned as having been attacked by SHEEP-SCAB and PARASITIC-MANGE in Ireland in the undermentioned period.

Quarter ended	SHEEP-SCAB.		PARASITIC-MANGE.	
	Outbreaks Reported.	Sheep Attacked.	Outbreaks Reported.	Animals Attacked.
30th Sept., 1915,	65	486	23	33

Veterinary Branch,  
Department of Agriculture and Technical Instruction  
for Ireland, Dublin.

ACCOUNT showing the QUANTITIES of certain kinds of AGRICULTURAL  
into Ireland during each WEEK

ARTICLES	WEEK ENDED				
	3rd July	10th July	17th July	24th July	31st July
<b>ANIMALS LIVING—</b>					
Horses. . . . . No.	—	—	—	—	—
<b>FRESH MEAT—</b>					
Beef (including refrigerated and frozen), . . . . . cwt.	—	—	—	—	—
Mutton, " " " " " "	—	—	—	—	—
Pork, " " " " " "	—	—	—	—	—
Unenumerated " " " " " "	—	—	—	—	—
<b>SALTED OR PRESERVED MEAT—</b>					
Bacon, . . . . . cwt.	—	—	—	—	—
Beef, . . . . . " "	—	—	—	—	—
Hams, . . . . . " "	—	—	—	—	—
Pork, . . . . . " "	—	—	—	—	—
Meat, unenumerated, Salted " "	—	—	—	—	—
Meat, preserved otherwise than by salting (including tinned and canned), . . . . . cwt.	—	—	—	—	—
<b>DAIRY PRODUCE AND SUBSTITUTES—</b>					
Butter, . . . . . cwt.	—	—	—	—	—
Margarine, . . . . . " "	137	—	—	66	125
Cheese, . . . . . " "	—	176	—	—	—
Milk, Condensed, . . . . . " "	140	46	5	111	29
" Cream, . . . . . " "	—	—	—	—	—
" Preserved, other kinds " "	—	—	—	—	—
<b>EGGS, . . . . . gt. hunds.</b>	—	—	—	—	—
<b>LARD, . . . . . cwt.</b>	—	63	—	—	—
<b>CORN, GRAIN, MEAL AND FLOUR—</b>					
Wheat, . . . . . cwt.	59,700	129,200	11,400	165,900	56,800
Wheat Meal and Flour, . . . . . "	1,400	19,600	5,000	10,600	—
Barley, . . . . . " "	—	—	—	73,600	—
Oats, . . . . . " "	9,100	—	—	—	—
Peas, . . . . . " "	—	—	—	—	—
Beans, . . . . . " "	—	—	—	—	—
Maize, or Indian Corn, . . . . . "	561,000	88,500	304,500	234,900	702,200
<b>FRUIT, RAW—</b>					
Apples, . . . . . " "	—	—	—	—	—
Bananas, . . . . . bunches	—	—	3,272	1,325	—
Currants, . . . . . cwt.	—	—	—	—	—
Gooseberries, . . . . . " "	—	—	—	—	—
Pears, . . . . . " "	—	—	—	—	—
Plums, . . . . . " "	—	—	—	—	—
Grapes, . . . . . " "	—	—	—	—	—
Lemons, . . . . . " "	—	—	—	—	—
Oranges, . . . . . " "	—	—	—	—	—
Strawberries, . . . . . " "	—	—	—	—	—
Unenumerated, . . . . . " "	—	—	—	—	—
<b>HAY, . . . . . tons,</b>	—	—	—	—	—
<b>STRAW, . . . . . "</b>	—	—	—	—	—
<b>MOSS LITTER, . . . . . "</b>	—	—	—	—	—
<b>HOPS, . . . . . cwt.</b>	—	—	—	—	—
<b>VEGETABLES, RAW—</b>					
Onions, . . . . . bushels	—	—	—	—	—
Potatoes, . . . . . cwt.	—	—	—	—	—
Tomatoes, . . . . . " "	—	—	—	—	—
Unenumerated, . . . . . value £	—	—	—	—	—
<b>VEGETABLES, DRIED, . . . cwt.</b>	—	—	—	—	—
Preserved by Canning, . . . "	—	—	—	—	—
<b>POULTRY AND GAME, . . . value £</b>	—	—	—	—	—

\* This Table is confined to the Imports of certain kinds of Agricultural Produce into a request from this Department kindly consented to separate the Irish Imports (direct) form of Weekly Returns



## AGRICULTURAL RETURNS OF ENGLAND AND WALES, 1915.

PRELIMINARY STATEMENT for 1915, compiled from the Returns collected on the 4th June; and comparison with 1914.

## CROPS.

Distribution.	1915.	1914.	INCREASE.		DECREASE.	
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Per Cent.</i>	<i>Acres.</i>	<i>Per Cent.</i>
TOTAL AREA (excluding WATER)	37,139,150	37,139,150	—	—	—	—
TOTAL ACREAGE under all CROPS and GRASS (a) .. ..	27,053,360	27,114,000	..	..	60,640	0·2
ARABLE LAND .. ..	10,965,640	10,998,250	..	..	32,610	0·3
PERMANENT GRASS (a) { For Hay .. 4,655,030 Not for Hay .. 11,432,690	16,087,720	16,115,750	102,390	0·9	130,420	2·7
TOTAL ..	16,087,720	16,115,750	..	..	28,030	0·2
Wheat .. ..	2,170,110	1,807,500	362,610	20·1	..	..
Barley .. ..	1,231,720	1,504,770	..	..	273,050	18·1
Oats .. ..	2,088,050	1,929,630	158,420	8·2	..	..
Rye .. ..	47,880	53,900	..	..	6,220	11·5
Beans .. ..	266,530	294,020	..	..	27,490	9·3
Peas .. ..	129,380	163,840	..	..	39,460	23·4
Buckwheat .. ..	2,650	3,040	..	..	390	12·8
Potatoes .. ..	463,400	461,620	1,780	0·4	..	..
Turnips and Swedes .. ..	931,760	1,045,090	..	..	113,330	10·8
Mangold .. ..	413,710	432,370	..	..	18,660	4·3
Cabbage and Kohl-Rabi .. ..	68,210	67,940	270	0·4	..	..
Rape .. ..	65,530	70,460	..	..	4,930	7·0
Vetches or Tares .. ..	109,630	123,730	..	..	14,100	11·4
Lucerne .. ..	53,000	53,650	..	..	650	1·2
Hops .. ..	34,740	36,960	..	..	1,920	5·2
Small Fruit .. ..	74,190	77,360	..	..	3,170	4·1
CLOVER and ROTATION GRASSES { For Hay .. 1,533,070 Not for Hay .. 824,300	2,357,370	1,554,910	..	..	16,840	1·1
TOTAL ..	2,357,370	826,440	..	..	2,140	0·3
OTHER CROPS .. ..	143,340	145,580	..	..	2,240	1·5
BARE FALLOW .. ..	309,640	340,740	..	..	31,100	9·1
ORCHARDS (b) .. ..	248,830	243,110	5,720	2·4	..	..

## LIVE STOCK.

	No.	No.	No.	Per Cent.	No.	Per Cent.
Horses used for Agricultural purposes (including Mares for Breeding) ..	729,080	791,300	..	..	62,220	7·9
Unbroken Horses } One year and above ..	209,770	220,570	..	..	10,800	4·9
(including Stallions) } Under one year ..	99,240	102,110	..	..	2,870	2·8
Other Horses .. ..	249,090	285,570	..	..	36,480	12·8
TOTAL OF HORSES ..	1,287,180	1,399,550	..	..	112,370	8·0
Cows and Heifers in Milk or in Calf ..	2,434,500	2,484,220	..	..	49,720	2·0
Other Cattle :—Two years and above ..	994,320	952,330	42,000	4·4	..	..
One year and under two ..	1,297,220	1,174,950	122,270	10·4	..	..
Under one year ..	1,338,100	1,266,440	71,660	5·7	..	..
TOTAL OF CATTLE ..	6,064,150	5,877,940	186,210	3·2	..	..
Ewes kept for Breeding .. ..	6,871,740	6,838,330	33,410	0·5	..	..
Other Sheep :—One year and above ..	3,481,650	3,151,550	330,100	10·6	..	..
Under one year ..	7,169,190	7,269,810	..	..	100,620	1·4
TOTAL OF SHEEP ..	17,522,580	17,259,690	262,890	1·5	..	..
Sows kept for Breeding .. ..	293,160	340,380	..	..	42,220	12·4
Other Pigs .. ..	2,121,870	2,141,100	..	..	19,230	0·9
TOTAL OF PIGS ..	2,420,030	2,481,480	..	..	61,450	2·5

(a) Excluding Mountain and Heath Land used for grazing (3,764,710 acres in 1915, as compared with 3,781,560 acres in 1914).

(b) Any Crop or Grass grown in Orchards is also returned under its proper heading.

## AGRICULTURAL RETURNS FOR SCOTLAND, 1915.

PRELIMINARY STATEMENT for 1915, compiled from the Returns collected on the 4th June; and comparison with 1914.

## CROPS.

Distribution.	1915.	1914.	INCREASE.		DECREASE.	
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Per Cent.</i>	<i>Acres.</i>	<i>Per Cent.</i>
TOTAL AREA (excluding WATER) ..	19,069,728	19,069,728	..	..	..	..
TOTAL ACREAGE under all CROPS and GRASS (a) ..	4,781,416	4,786,181	..	..	4,765	0.1
ARABLE LAND ..	3,290,543	3,295,487	..	..	4,944	0.2
PERMANENT GRASS (a) (For Hay ..	155,686	156,602	..	..	976	0.6
Not for Hay ..	1,335,187	1,334,032	1,155	0.1	..	..
TOTAL ..	1,490,873	1,490,694	179	0.0	..	..
Wheat ..	76,862	60,521	16,342	27.0	..	..
Barley (including Bere) ..	149,720	194,109	..	..	44,389	22.9
Oats ..	981,708	919,580	62,128	6.8	..	..
Rye ..	5,580	5,349	231	4.3	..	..
Beans (to be harvested as Corn) ..	5,501	6,123	..	..	622	10.2
Peas ..	935	691	244	35.3	..	..
Potatoes ..	144,321	152,318	..	..	7,997	5.3
Turnips and Swedes ..	420,735	430,608	..	..	9,873	2.3
Mangolds ..	2,657	1,927	730	37.9	..	..
Cabbage ..	4,808	5,015	..	..	207	4.1
Rape ..	6,250	8,754	..	..	2,504	28.6
Vetches or Tares, for Seed ..	1,013	882	131	14.9	..	..
Vetches, Tares, Beans, Mashlum, etc., for Fodder ..	9,942	10,678	..	..	736	6.9
Lucerne ..	6	6	..	..	..	..
Carrots ..	385	446	..	..	61	13.7
Onions ..	195	186	9	4.8	..	..
Flax ..	5	6	..	..	1	16.7
Small Fruit ..	7,069	7,271	..	..	202	2.8
RYE-GRASS and other (For Hay ..	390,193	403,254	..	..	18,061	4.4
ROTATION GRASSES and CLOVER Not for Hay ..	1,072,765	1,073,655	..	..	890	0.1
TOTAL ..	1,462,958	1,481,909	..	..	18,951	1.3
OTHER CROPS ..	1,871	1,880	..	..	9	0.5
BARE FALLOW ..	8,021	7,228	793	11.0	..	..
ORCHARDS (b) ..	1,484	1,473	11	0.7	..	..

## LIVE STOCK.

	No.	No.	No.	Per Cent.	No.	Per Cent.
Horses used for Agricultural purposes (including Mares for Breeding) ..	128,755	135,523	..	..	6,768	5.0
Unbroken Horses) One year and above (including Stallions) ..	32,416	33,004	..	..	588	1.8
Under one year ..	13,272	13,690	..	..	418	3.1
TOTAL ..	174,443	182,217	..	..	7,774	4.3
Other Horses ..	24,516	27,143	..	..	2,627	9.7
TOTAL OF HORSES ..	198,959	209,360	..	..	10,401	5.0
Cows in Milk ..	360,913	363,619	..	..	2,706	0.7
Cows in Calf, but not in Milk ..	43,258	44,200	..	..	942	2.1
Heifers in Calf ..	44,769	45,884	..	..	1,115	2.4
Other Cattle :—Two years and above ..	228,379	242,070	..	..	12,691	5.2
One year and under two ..	293,338	271,442	21,896	8.1	..	..
Under one year ..	251,173	247,759	3,414	1.4	..	..
TOTAL OF CATTLE ..	1,222,830	1,214,974	7,856	0.6	..	..
Ewes kept for Breeding ..	3,001,675	2,975,008	26,667	0.9	..	..
Other Sheep :—One year and above ..	1,219,417	1,166,983	52,434	4.5	..	..
Under one year ..	2,838,349	2,883,829	..	..	45,480	1.6
TOTAL OF SHEEP ..	7,059,441	7,025,820	33,621	0.5	..	..
Sows kept for Breeding ..	17,627	19,409	..	..	1,782	9.2
Other Pigs ..	141,088	133,359	7,729	5.8	..	..
TOTAL OF PIGS ..	158,715	152,768	5,947	3.0	..	..

(a) Excluding Mountain and Heath Land used for grazing (9,107,581 acres in 1915).

(b) Any Crop or Grass grown in Orchards is also returned under its proper heading.

QUARTERLY JOURNAL  
OF  
THE DEPARTMENT.

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NOTE.—The yields of Rye in the small tabular statement at the foot of page 232, and the similar statement on page 234, should be read as cwt. qr. lb. and not t. c. q. as printed.

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DEPARTMENT OF AGRICULTURE  
AND  
TECHNICAL INSTRUCTION FOR IRELAND.

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JOURNAL.

The Council of Agriculture—The Vice-President's Address—Reclamation of Bog Land—Field Experiments, 1915—Fourth Irish Egg-Laying Competition—Egg Records for the Year 1914-15—Feeding Pigs on Grass Land—Flax for 1916 Sowing—Allotment Gardening in Belfast—Official Documents—Notes and Memoranda—Statistical Tables.

SIXTEENTH YEAR

No. 2

JANUARY, 1916.



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## NOTICE.

*Communications respecting the literary contents of this JOURNAL should be addressed to the Superintendent of the Statistics and Intelligence Branch, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin.*

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## THE COUNCIL OF AGRICULTURE.

The Twenty-eighth Meeting of the Council of Agriculture took place on Tuesday, 16th November, 1915, in the Lecture Theatre of the Royal Dublin Society, Leinster House, Kildare Street, Dublin (by kind permission of the Council of the Society).

The Chair was taken at 11 a.m. by the Right Hon. T. W. Russell, P.C., M.P., Vice-President of the Department.

His Excellency the Lord Lieutenant (Lord Wimborne) was present during portion of the proceedings.

The following were present :—

*Representing the Department*—The Vice-President; T. P. Gill, Secretary; J. R. Campbell, B.Sc., Assistant Secretary in respect of Agriculture; George Fletcher, F.G.S., Assistant Secretary in respect of Technical Instruction; J. S. Gordon, B.Sc., Deputy Assistant Secretary in respect of Agriculture and Chief Agricultural Inspector; H. G. Smith, M.A., LL.D., Chief Clerk; Thomas Butler, Superintendent of the Statistics and Intelligence Branch; J. P. Walsh, Clerk in Charge of Accounts; J. V. Coyle, B.L., Senior Staff Officer; F. J. Meyrick, M.A.; A. Kelly; John Hogan, B.A.; W. Bowers, and M. Deegan.

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*Connacht.*

The Right Hon. Lord Clonbrock, K.P., H.M.L.; Patrick D. Conroy, J.P.; P. J. Costello, J.P.; Rev. Joseph G. Digges, M.A.; Sir Josslyn Gore-Booth, Bart., J.P., D.L.; Bernard Harte, J.P.; John Lohan; Rev. P. J. Manly, P.P.; Daniel Morrin, J.P.; Rev. Philip J. Mulligan, P.P.; John O'Dowd, J.P., M.P.; Robert P. Wallace, J.P.

Mr. J. V. Coyle acted as Secretary to the Meeting.

The minutes of the twenty-seventh meeting, 4th May, 1915, a copy of which had been sent to each member of the Council, were taken as read, and were signed as correct.

Communications expressing regret at their inability to attend the meeting were received from the Right Hon. Lord Monteagle, K.P.; the Most Reverend Denis Kelly, D.D., Lord Bishop of Ross; Mr. Hugh T. Barrie, M.P.; Mr. John Belger, J.P.; Mr. Peter Ffrench, M.P.; Mr. William Field, M.P.; Captain J. E. B. Loftus, J.P.; and Mr. Walter M'M. Kavanagh, D.L.

The Vice-President stated he regretted to have to inform the Council that he had just learned unofficially of the sudden death of Mr. Thomas J. Byrne, a member of the Council since its establishment, in whose name a very important resolution appeared on the Agenda for the present meeting.

The Vice-President delivered his address. (See pp. 216 *et seq.*)

A discussion took place on several matters arising out of the Vice-President's address, *e.g.*, the closing of Ballyhaise Agricultural Station and the continued working of the farm attached to the station; the termination of the employment of two instructors in dairying; supply of flax seed and increased food production.

The Vice-President asked His Excellency to address the meeting.

His Excellency the Lord Lieutenant, in expressing his pleasure at having been afforded an opportunity of meeting the members of the Council, stated that as Director-General for Recruiting for Ireland he was concerned in the question of securing additional men for the Army. Notwithstanding that the suggested extension of the area under tillage might require an increase in the amount of labour employed, he was of opinion that the farming interest in Ire-

land ought to be able to give him some percentage of the recruitable agricultural population.

Referring to a point raised in the course of the discussion on the Vice-President's address by Mr. J. S. F. M'Cance, who stated that confusion had arisen in the North as to whether His Excellency's recruiting scheme was the same as that of Lord Derby in England, His Excellency explained that he had never made any allusion to what might be called the Derby scheme. He was not for the moment accepting any deferred enlistments. Possibly, however, by the establishment of local Committees it could be decided which of those men who were prepared to enlist should be taken; in other words, such Committees could determine who were the essential men who could not be spared, and who were the less essential men who could be spared.

As he intended soon to address a special appeal to the farming class to help in the work of recruiting, he wished the members of the Council to take the matter into consideration in the meantime, as he hoped he might look to them for assistance in obtaining not merely recruits, but recruits of the right type.

Rev. Lorcan Ua Ciarain, P.P., suggested that the best informed body to determine what men could be spared would be the County Council.

Mr. H. de F. Montgomery, D.L., thought that the Rural District Council could do the work far better than the County Council.

Mr. Wm. McDonald, J.P., did not think that the County Councils knew the men who could be spared, but thought they would be willing to co-operate.

His Excellency, having stated that he would be very glad to have the assistance of these Councils, then withdrew.

The following resolution standing in the name of Mr. Thomas J. Byrne, J.P., (Co. Louth) was proposed by Mr. James McCarthy, J.P. (Co. Louth), and seconded by Mr. Michael Slattery, J.P. (Co. Tipperary):—

“That with the view of the further development of the production of home-grown feeding stuffs, and the extension and improvement of the area at present under tillage, this Council is of the opinion that one of the best means to that end would be the establishment in each County of a certain number of Agricultural Implement Depots under the control of the County Committee and their officials, and that money for this purpose should be supplied by the Department by loan on the security of the rates, the repayment of same to be spread over a limited number of years.”

After protracted discussion the resolution was re-drafted as follows and adopted by the meeting, Mr. P. J. Kennedy, J.P., dissenting:—

"That, with a view to the further development of the production of home-grown feeding stuffs, and the extension and improvement of the area at present under tillage, this Council is of opinion that the Department should grant to small farmers, on suitable terms, loans for the purchase of agricultural implements, such loans to be repaid within a limited number of years, and that a portion of the unexpended balances to credit of County Committees, remaining in the hands of the Department, should be utilized for the purposes of such loans."

On the motion of Mr. Robert Downes (Co. Westmeath), seconded by Mr. James McCarthy, J.P. (Co. Louth), the following resolution was passed unanimously :—

"That the Council has heard with deep regret of the death of Mr. Thomas J. Byrne, who, for the past twelve years, had been a member of this Council, and one of the most valued contributors to its deliberations, and they desire to express their sincere sympathy with his family."

*On re-assembling at 3.30 p.m. after the luncheon interval the Vice-President intimated that the Connacht Provincial Committee would meet in another room for the purpose of electing a member of the Agricultural Board in room of the late Rev. Charles Flynn, P.P., V.G.*

*The representatives of Connacht accordingly adjourned to an adjoining room.*

The following resolutions standing in the name of Mr. William Field, M.P. (Co. Dublin), were not moved owing to the absence of Mr. Field :—

(i) (a) "That this Council recommends the Department to carry out extensive experiments in the use of the Humogen Peat Fertilizer, and to report on the results of such experiments.

(b) "That this Council recommends that the Department should institute inquiries in the various countries where peat is used as fuel, with a view to ascertaining whether any improvement is necessary in the method of preparation at present adopted in Ireland.

(ii) "That the Department should inquire into the results of the beet culture undertaking in England, and communicate the facts to the members of this Council.

(iii) "That this Council urges strongly upon the Department the desirability of obtaining from Parliament, at the earliest date possible, power to register all sires, horses, bulls, rams, and boars, and to prevent any inferior or diseased animal from being used for public service in Ireland.

(iv) "That this Council requests the Department to report as to the progress made in the Warble Fly investigations."

The Vice-President suggested that while awaiting the return of the Connacht representatives Mr. Campbell should give the meeting some information with regard to the following matters dealt with in Mr. Field's notice, viz : peat fertilizer experiments, beet culture, peat fuel and the warble fly experiments.

The Assistant Secretary in respect of Agriculture accordingly made a brief statement giving (1) the details of experiments carried out by the Department on the use of the Humogen Peat Fertilizer ; (2) the results of an investigation made by Inspectors of the Department into the progress of the beet-culture undertaking in England, as well as the methods adopted in other countries in the preparation of peat for fuel ; and (3) the present position of the warble fly investigations.

The Vice-President announced that the Connacht Provincial Committee had elected the Very Rev. James Canon Daly, D.D., P.P., a member of the Agricultural Board in the room of the late Rev. Charles Flynn, P.P., V.G.

Mr. James P. Farrell, M.P. (Co. Longford), proposed the following resolution, which was seconded by Mr. Robert P. Wallace, J.P. :—

“That the continuance of the destruction of timber by the wholesale cutting down of trees, particularly on purchased estates, is a violation of the Act of Parliament for the proper protection of the woods and forests of Ireland ; and that in the opinion of this Council, the Estates Commissioners should, through their Inspectors, especially in the Congested Districts, take more care than is at present being shown to insist upon replanting in all cases where matured trees are being sold.”

The Vice-President having pointed out that the powers conferred by Section 32 of the Land Act of 1909 were limited in extent, Mr. Farrell asked permission to withdraw his resolution.

The resolution was accordingly, by leave, withdrawn.

In accordance with notice, the Rev. P. J. Manly, P.P., called attention to the matter of Live Stock Insurance and inquired what consideration had been given by the Department to the subject, especially as applicable to the needs of small farmers in the West of Ireland.

After a short discussion the Vice-President intimated that the Department would prepare for submission to the next ordinary meeting of the Council a formal report on the subject.

The following notice standing in the name of Mr. Peter Ffrench, J.P., M.P. (Co. Wexford), was not moved in the absence of Mr. Ffrench :—

“To call attention to some methods of cropping land and putting it out under grass, and to move a resolution.”

The proceedings terminated at 5.30 p.m.

## THE VICE-PRESIDENT'S ADDRESS.

YOUR EXCELLENCY, MY LORDS AND GENTLEMEN,

This is the third occasion on which the Council have assembled under the shadow of war. The conflict that was being waged when we last met is still desolating Europe. It is consuming more and more of the manhood and resources of the nation, and is being fought out with the same determination and appalling ferocity. The circumstances under which we meet to-day may, therefore, well impress each and every one of us with a grave sense of duty and responsibility. There are those—happily they are few in number—who assert that the war is no affair of Ireland's. This assertion may be the outcome of genuine conviction, but it is fundamentally opposed to the feelings and belief of the overwhelming majority of the Irish people. The war is as much Ireland's war as it is Belgium's or Serbia's. It may not have seared us as it has seared those countries, but its effects are being brought home to us in a multitude of ways. I will, therefore, deal first of all with the position of the work of the Department.

### A POLICY OF RETRENCHMENT.

The prevailing financial stringency has, as might have been expected, affected every branch of our work. The income of the Department is derived from two sources:—(1) the moneys annually voted by Parliament, which come to us through the Treasury; and (2) the Endowment Fund, a portion of which consists of capital sums held by the Department and invested in gilt-edged securities. I mentioned at the last meeting of the Council that every branch of the public service was being pressed to exercise exceptional economy and foresight. This pressure from the Treasury has naturally increased with the prolongation of the war and the tremendous demands that are being made upon the National Exchequer. Many of the services to which Parliamentary votes are applied have been curtailed, others are threatened, and it is impossible to say where this policy of retrenchment may end.

But, up to the present, it is in regard to the Endowment Fund that the principal difficulty we have to deal with here has arisen. The extent to which this Fund suffered, in the first place from over-spending in some valuable branches of work, and in the second, from the fall in the value of securities before and following the outbreak of war, necessitated a radical revision of the annual estimates laid before the Agricultural Board. A scheme of reduction, amounting approximately to £31,000, was accordingly prepared by the Department, and finally approved of at a recent meeting of the Board. The scheme involved the making of smaller grants to the County Com-

mittees, the suspension of certain classes of work, the curtailment of others, and the dismissal of a number of officials. These dismissals were a source of sincere regret to the Department. I am happy to say, however, that other employment has been found for most, if not all, of those who have suffered in this way.

#### AN HONOURABLE RECORD.

I may at this point mention the fact that some 120 members of the staff of the Department, including three ladies, have so far joined the Army. Of these 6 have already laid down their lives for their country. In addition, many others have been transferred to munitions work or are being employed by the War Office in connection with the purchase of forage. The positions of practically all these men and women are, in accordance with Treasury regulations, being kept open for them. They are receiving their Civil Service salary, less their army pay and allowances. No appreciable saving can, therefore, be looked for under this head. My main object in referring to the case of these officials is to put on record an appreciation of the practical patriotism of those of them who have joined the fighting forces. They certainly have shouldered their share of the common burden, and deserve the best thanks of the nation in this supreme hour of its destinies.

#### AGRICULTURAL STATION AT BALLYHAISE.

Before passing from the question of the finances of the Department, I wish to deal in some detail with one particular item of reduced expenditure that has caused, and is causing, no little public comment in Parliament and in the Press. I refer to the Agricultural Station at Ballyhaise. Now, in what I have said so far, I have mentioned the compelling circumstances under which a great deal of really useful work has had to be either cut down or entirely suspended. I have stated that a deficit of £31,000 had to be faced and overcome. The task was one of extreme difficulty and complexity. Grants made to County Committees had to be reduced. Schemes had in many cases to be dropped and in others to be revised. The cost and working of our Agricultural Schools and Stations, at Ballyhaise and elsewhere, had to be reviewed. The relative value of each branch of work had to be taken into account, and the interests not only of particular districts, but of the country as a whole, to be weighed and considered. In all this effort to bring the expenditure of the Department within its income, the Agricultural Board have been consulted step by step. They have scrutinised every one of the economies proposed by the Department, and have examined and approved of the scheme of retrenchment in its entirety. I think it necessary to emphasise the part played by the Agricultural Board

in this matter, as the opinion seems to prevail that the action of the Department has been arbitrary and not subject to any check or control.

The facts in regard to the Agricultural Station at Ballyhaise are briefly as follows. Of the several educational establishments owned by the Department it was considered that this one could be shut down with least injury to our programme of education, and with greatest advantage to our finances. The property is an extensive and scattered one. Much of the land is remote from the farm buildings, and a not inconsiderable area of it is under woods, bog, marsh and water. The Department decided—and the Agricultural Board concurred in the decision—to close the school for the present, to sell the outlying lands and part of the stock, and to retain what may be called the core of the lands, by which I mean the home farm. Certain portions of land have already been bought by villagers, and other portions will be offered for sale in due course. But tillage operations are in progress on the home farm, and not only will the area previously cultivated be tilled in the coming year, but we shall certainly follow the advice we have offered to farmers throughout the country, and put additional land under the plough. It is impossible to predict at this stage what will be the future of the Ballyhaise institution, or of the home farm attached to it. The position is such that I must leave the hands of the Department and the Agricultural Board free for any eventuality.

#### FINANCIAL OUTLOOK.

As regards the financial outlook generally, I cannot say that it is in any sense bright or encouraging. With the conclusion of the war—whenever that may come—times of great difficulty will have to be met. Rigid economy will for many long years be the keynote of national expenditure. It may be that these present financial embarrassments are only the shadow of other and greater embarrassments awaiting us in the immediate future. I must, therefore, ask the Council, and through them the public, to make allowance for the policy of retrenchment of useful and reproductive work which the Department has been obliged to adopt, and which was resorted to only with the greatest reluctance, and under the pressure of extreme necessity.

#### SUPPLY OF HOME-GROWN FOOD.

Since the last meeting of the Council the question of the supply of home-grown food has engaged the attention of Departmental Committees in England, Scotland and Ireland. The Government requested the Department to appoint a Committee “to consider and report what steps should be taken by legislation or otherwise for the sole purpose of maintaining and, if possible, increasing the present



production of food in Ireland, on the assumption that the war may be prolonged beyond the harvest of 1916." A strong and representative Committee was accordingly formed without loss of time. It held nine sittings, examined a number of witnesses, made as complete an inquiry as was possible in the circumstances, and reported to the Government within eight weeks of the date of its appointment. As the Report of the Committee has been widely circulated, and each member of the Council duly received a copy of it, I need not now deal with it in any detail. The terms of the Reference under which the Committee sat practically narrowed the inquiry to an examination of our system of tillage, and the possibility of bringing more land into cultivation. On a full consideration of all the facts the Committee tentatively recommended the fixing of a minimum price for wheat and oats. They also made recommendations in favour of the maintenance and improvement of breeding stock, the provision of facilities to enable the smaller farmers to obtain agricultural implements and machinery, the conservation of the artificial manure supply of the country, and the maintenance of the Irish fishing industry. The Government have not deemed it advisable to fix minimum prices for any class of farm produce.

#### PRESERVATION OF BREEDING STOCK.

But the Maintenance of Live Stock Act, which received the Royal Assent while the Committee was in session, enables the Department to deal adequately with the question of the preservation of breeding stock. The Act is a war measure, and applies to Great Britain as well as Ireland. It provides facilities for preventing (*a*) the slaughter of animals suitable for breeding purposes, and (*b*) the exportation of such animals as ought to be kept in the country. Under these powers the Department has made an Order, which came into operation on the 1st September, prohibiting the slaughter or the exportation of cattle and swine obviously or visibly in-calf or in-pig. The object of the Order is to ensure that the young of such animals shall be born in Ireland, and be available to assist in maintaining our live stock population at its proper level.

#### THE FOOD PRODUCTION CAMPAIGN.

As to the possibility of increasing the supply of home-grown food, the Department is carrying out what may be truly called a great campaign, with the object of directing public attention to the position of Ireland as regards the cultivation of her arable land. A large number of meetings have been held in connection with the campaign at selected centres throughout the four provinces. These meetings, convened by the County Committees of Agriculture, have one and all been signally successful. They were thoroughly

representative of the districts in which they were held, and the proceedings throughout were marked by a spirit which promised exceedingly fruitful results. In addition to this platform propaganda, the entire Press of the country has cordially co-operated with the Department in promoting the food production movement. Posters urging the farmers to till more land and to breed more live stock and poultry are being displayed throughout the length and breadth of the land. All the Agricultural Instructors have been turned full tilt on to this work, and brief pointed leaflets, with other suitable literature, are being distributed to every rural householder in the country, 500,000 in number. The campaign has not, of course, been exempt from the usual amount of criticism that comes from certain quarters and impartially attends every word and act of the Department. On the present occasion the criticism has mainly consisted of the prediction that all this "whistling to the wind" is doomed to futility. It is apparently forgotten that the lesser efforts made last year resulted in the addition of over 80,000 acres to the food-producing area of the country. But whatever may be the outcome of the campaign—and those who have had most to do with it are most sanguine as to its results—it has focussed public attention upon one fact of enormous interest and significance. The people as a whole, and many of them for the first time, now understand that only 16 per cent. of the arable land of Ireland is put under the plough. In some counties the amount tilled is as low as 8 or 9 per cent. Our position in this respect compares most unfavourably with that of every other civilised country in the world. If the widespread publication of so humiliating a statement as this, coupled with the efforts of the Department to point the way to other and better things, does not result in a very much greater extension of tillage than the 80,000 acres added to our ploughed land last season, well, all I can say is that the fault will not lie at the door of the Department. It will lie at the door of those farmers who persist in sinning against light and knowledge.

#### LOANS FOR PURCHASE OF IMPLEMENTS AND MACHINERY.

A question that has kept constantly cropping up since the increased production of food became such a clear-cut issue, is the provision of facilities for obtaining agricultural implements and machinery. Personally I look upon this question as one of urgency and importance, and I was glad when my friend, the late Mr. Byrne, proposed to move a resolution on the subject. As the Council are aware, the Department has for some years been lending money for this purpose. These operations, however, have suffered curtailment along with the other work of the Department, and they are at present practically confined to the Congested Districts.

In considering the problem of helping our agriculturists generally in this direction, there is one circumstance that ought to be remembered. While the purchase of small implements is, as a rule, within the means of the average farmer, or of two or three farmers combining together, expensive machinery—especially power-driven machinery—can in most cases be purchased more easily, as well as used more economically, by larger groups of farmers. Judging from the numerous inquiries and applications for loans received by the Department, there appears to be room for a scheme dealing with the supply of such machinery as power-driven threshers and corn mills, as well as motor ploughs for certain districts.

#### LOANS AND SELF-HELP.

Since the outbreak of war a number of loans for the purchase of machinery of this character have been granted to applicants in counties containing Congested Districts. Other similar applications are at present under consideration, or are being held up pending the provision of additional funds. At the instigation of our officers, a few Co-operative Societies have recently purchased threshing sets by means of loans from Joint Stock Banks, while others are negotiating for similar loans. Self-help such as this deserves every commendation and encouragement. The advice and assistance of the Department, and of the local Agricultural Instructors and Overseers, are available for groups of farmers, and for farmers' societies, co-operative or otherwise; and there is no reason why the example of the societies I have just alluded to should not be followed all over the country.

I am persuaded that along with this demand a great need exists in some areas for small implements and minor and less costly machinery essential for cultivating the soil and harvesting the crops. But, as I have already mentioned, the cost of these does not place them beyond the reach of the majority of farmers, individually or in groups of two or three, and there is not the same difficulty in this case as in that of the larger agricultural machinery.

#### A QUESTION OF WAYS AND MEANS.

There is, I regret to say, little prospect of our obtaining the necessary financial assistance from the Treasury. As a matter of fact the Department applied for an advance for this purpose more than twelve months ago, but the application was refused. Subsequent developments have not improved the chance of help coming from that quarter, and so far as I can see there is only one way in which the problem may possibly be solved. The Food Production Committee recommended that, if a new scheme of loans for the purchase of implements and machinery were adopted, the County Committees

of Agriculture should have charge of it in their respective districts, they being in turn responsible to the Department. Now there is a reserve representing balances of money earmarked for County schemes, standing to the credit of the Committees of Agriculture in the books of the Department. If even a portion of the securities in which these moneys are invested could be realised without too great a sacrifice, it would become possible to finance a scheme that would meet the pressing needs of the situation. As this very difficult question of ways and means is to be considered to-morrow by the Agricultural Board, I am exceedingly glad that the notice of motion which appears on our agenda paper will afford the Council an opportunity of expressing their views and wishes in the matter.

#### IMPORTATION OF FLAX SEED.

I come now to a subject that specially affects the representatives of Ulster. I refer to the question of the supply of flax seed for sowing next year. Towards the end of September the Department had a conference in Belfast with representatives of the several firms engaged in the importation of flax seed. As a result of that conference, a communication was addressed to the Foreign Office, setting out the difficulties experienced by importers, and requesting that the necessary steps should be taken to facilitate the importation of the seed required. And as it was so important that the matter should receive the fullest consideration, I arranged for a conference at the Foreign Office, which I personally attended, along with representatives of seed-importing firms. The situation was fully discussed on this occasion. I was assured that the Foreign Office had been doing, and would continue to do, all in their power to facilitate the transfer of flax seed from Russia and Holland to this country; and was informed it was most desirable that Irish importers should keep in constant touch with the Commercial Attachés at the British Embassy at Petrograd, and the British Legation at The Hague.

#### DIFFICULTIES AFFECTING IMPORTATION.

I may explain that the trouble in regard to the importation of the Russian seed is mainly due to the congestion by war material of the railway between Petrograd and Archangel, and to the fact that the Port of Archangel will shortly be closed by ice. It is, however, anticipated that consignments will be obtainable via Sweden, as certain obstacles to commerce which existed in the case of that country, and also in that of Finland, have been removed. As to the Dutch seed, the difficulty arises from an objection on the part of the Dutch Government to its exportation, in view of our refusal to permit the entry of seed for crushing purposes into Holland.

This difficulty was gone into very fully during the conference at the Foreign Office, and I can only say that there is a possibility of its removal.

#### AVAILABLE SUPPLY OF FLAX SEED.

A limited amount of Russian seed has remained over from last year. Some home-grown seed is also available, but the quantity is very small. It is regrettable that the Department's appeal to the flax-grower, to save as much seed as possible, met with so poor a response. The weather conditions at harvest time may, however, have been largely responsible for the failure to lessen our dependence upon foreign countries in this respect. While it will be possible to augment the small amount of seed in hand by obtaining some suitable seed of Canadian origin, we will, unfortunately, still have to rely on Russia and Holland for the bulk of our supply.

#### WEEDS AND AGRICULTURAL SEEDS ACT.

The work in connection with the agricultural seed supply generally has been well maintained. I may say that, during the past season, the Department's Official Samplers made the usual exhaustive examination of the seeds sold throughout the country. The activity of these officials may be gauged from the fact that they took 4,901 samples from the stocks of 1,067 vendors of seed. I do not propose to analyse the results of the tests of such of the samples as came under examination at the Seed Testing Station. Full information on this point will be found in the Annual Report of the Proceedings under the Weeds and Agricultural Seeds Act.

#### A FRESH AND GRATIFYING ADVANCE.

But I wish to deal less cursorily with one direction in which there has been a peculiarly gratifying advance. The Council will doubtless remember that at a conference held in Belfast in 1913, the Irish seed cleaners agreed not to sell Italian rye-grass seed below 16 lbs. bushel weight or perennial rye-grass seed below 20 lbs. As a result of that agreement, there has been a marked advance in the quality of the rye-grass seed sold throughout the country. But the Department considered that even these standards were capable of improvement, and at a further conference between representatives of the Department and of the seed cleaners, held in Belfast last September, a minimum of 18 lbs. was adopted for Italian, and one of 24 lbs. for perennial rye-grass. If the new agreement is as honourably observed as the previous one was, and no Italian and perennial rye-grass seed below the bushel weights I have indicated is put upon the market, the difficulty in regard to these two classes of seed

will be largely, if not entirely, overcome. The seed cleaners have met the Department fairly in the negotiations which led up to this valuable reform, and I gladly make this public acknowledgment of their desire to remove all causes of complaint.

#### POSITION OF IRISH SEED MERCHANTS.

It should be borne in mind that, under the Weeds and Agricultural Seeds Act, the Department possesses powers of supervision over the seed trade which have no counterpart in Great Britain. Compulsory sampling of seed does not exist in either England or Scotland, and bad seed may be sold there without the public knowing anything about it. On the other hand, seed merchants in Ireland are subject to the full light of public investigation. I think it only fair to make this observation, because the action of the Department, in seeking to improve the standard of agricultural seeds, has given rise to the impression that the Irish seed trade is conducted on a reprehensible basis and compares unfavourably with the seed trade in Great Britain. This impression is for the most part due to criticism based on an incorrect appreciation of the facts. As I have explained on more than one occasion, it is possible to test but a small proportion of the stocks of the 4,000 seed traders scattered all over the country. Only the seeds that look doubtful can be sampled, and the samples that are taken undergo a process of selection when they reach the hands of the more expert officer at the Seed Testing Station. As this system of control lends itself to misrepresentation, I consider it only fair to explain and emphasise once more the conditions under which the work in question is carried on.

#### ADULTERATION OF FERTILISERS AND FEEDING STUFFS.

The Department is keeping a watchful eye on the quality and adulteration of other articles besides agricultural seeds. Strict supervision is being exercised, through the Agricultural Instructors and Official Samplers, over the feeding stuffs sold to the Irish farmer. As the vendors are usually careful to comply with the strict requirements of the Fertilisers and Feeding Stuffs Acts, it is impossible to do away entirely with the sale of unsuitable and high-priced compound feeding stuffs. But our agriculturists are more and more realising the questionable value of these commodities, and are purchasing them in diminishing quantities. The purity of linseed cake meals; the conditions under which products of maize, from which portion of the oil has been artificially extracted, are sold; the adulteration of tailings; the presence of excessive moisture in bran—all these, and other cognate matters, are under constant attention.

### THE QUESTION OF WATER IN BUTTER.

Before I pass from the subject of adulteration, I wish to refer briefly to the sale of butter containing an undue proportion of water. An exceptionally large number of prosecutions for this offence have been successfully undertaken during the past few months. The Local Authorities are invested by statute with the duty of instituting these proceedings, but a few of them have shown a surprising reluctance to take action in the matter. Where, however, a Local Authority fails in this duty, the Department can step in, prosecute, and charge the cost to the Authority concerned. There have recently been cases of the sale of butter containing as much as 28 and 30 per cent. of water. This amounts to flagrant fraud upon the purchaser, who very often belongs to the poorest section of the community. Yet there are Irish counties where it is impossible to get the magistrates to impose fines of more than 1*d.* or 6*d.* in such cases, and the costs constitute the only deterrent upon the offenders.

### WAR OFFICE AND IRISH HAY.

The purchase of hay for army purposes has been engaging so much public attention, and the action of the Department in connection with it has been so misunderstood and misrepresented, that I wish to make a public statement on the subject. It is now some months since Colonel Morgan, the Executive Officer controlling the hay-purchasing arrangements of the War Office in the United Kingdom, called upon me and requested the advice and assistance of the Department. He explained the needs of the army in regard to hay, and the relevant powers of the military authorities under the Defence of the Realm Act. He added that it was intended to treat the growers of Irish hay with every possible consideration. I then, on behalf of the Department, suggested (*a*) that a fair price should be paid for any hay thus purchased; (*b*) that there should be a ready court of appeal to decide such disputes as might arise between the vendor and the purchaser; and (*c*) that sufficient hay should be left with the grower to feed his own stock. Colonel Morgan immediately accepted these suggestions. He afterwards agreed to a further suggestion, which was subsequently made, that the case of dairymen, car drivers, and other purchasers of hay in cities and towns, should receive consideration.

### COMPLAINTS ON THE PART OF HAY OWNERS.

But in spite of all these arrangements, many complaints reached the Department. The complaints came principally from farmers in County Dublin, and were almost entirely confined to the question of price. It was only natural that there should be a certain amount

of dissatisfaction, in view of the fact that the military authorities claimed the first call upon certain specified classes of hay, and thus upset the ordinary market conditions. Moreover, farmers would not be human if they under-estimated the value of their produce. That there was some ground for complaint is proved by one fact. The War Office authorities in Scotland published advertisements offering fixed prices for hay to be delivered during the spring months. As a similar offer was not being made to Irish farmers, the Department at once took up the position that the prices to be paid should be the same in both countries. The matter was discussed at a conference between hay-growers and representatives of the military authorities; and at a later conference, over which I myself presided, this anomaly was removed. The following scale of maximum prices for the best hay suitable for overseas consumption was accordingly decided upon by the military authorities:—

November,	.	.	.	.	90s. per ton.
December,	.	.	.	.	95s. „
January,	.	.	.	.	100s. „
February,	.	.	.	.	105s. „
March,	.	.	.	.	115s. „
April,	.	.	.	.	120s. „
May, and after,	.	.	.	.	125s. „

#### ACTION OF THE DEPARTMENT.

Now, gentlemen, let me make it absolutely clear that the Department has expressly and consistently refused to assume any responsibility as regards the price to be paid by the War Office for this commodity. It has on more than one occasion convened conferences between representatives of the military authorities and farmers from the four provinces. These farmers acted in a purely advisory capacity. They did not fix the price of hay, but only gave information as to the price at which it could be normally purchased in their respective districts. The Department was asked, as the Irish State Department of Agriculture, to assist another State Department in the performance of a very difficult duty. This it has done readily and freely. It has facilitated the military authorities in getting the best advice, and has assisted them in any other way within its power. But apart from the initial negotiations between Colonel Morgan and myself, its one overt act—if I may use such an expression—of anything more than an advisory character, on the question of price, was to tell the military authorities that it was impossible to justify the payment of one price in Scotland, and another in Ireland, for the same article. The view of the Department was accepted, and the prices were, as I have stated, equalised in both countries. I may add that the Department has



now nominated a Committee consisting of two representatives from each province, to advise and confer with the military authorities, as occasion may require, on matters connected with the supply of forage for army purposes.

#### IRELAND FREE FROM FOOT-AND-MOUTH DISEASE.

The Council will have observed the recent occurrence of foot-and-mouth disease in Somersetshire and Wiltshire, and the extension of the outbreak to Pembrokeshire in Wales. It may also be noted that foot-and-mouth disease has been causing great havoc in the United States, and that it is prevalent in many countries on the European continent. Up to the present no symptom of its existence has been detected in Ireland, and the fullest inquiry has not elicited anything to connect Irish live stock with the English and Welsh outbreaks. But I have a word to say in this connection which I think is very necessary. The Department has been severely criticised for not sanctioning the importation of calves from England, with a view to maintaining the proper quota of live stock in this country. The policy of free importation of calves has been strongly urged upon the Department, and has been as strongly resisted. All who have been concerned in this agitation ought to take warning from the fact that what happened in the last serious outbreak of foot-and-mouth disease in the South of Ireland is precisely what happened a few weeks ago across the Channel. In the one case, the movement of calves from Cork to certain adjoining districts created a lamentable situation. In the other, the same cause—the movement of calves—appears to have been responsible for the rapid extension of the disease in England and Wales. As a matter of fact, the calves which helped to spread the disease on the present occasion came from one of the districts from which the Department were urged to admit calves into Ireland.

#### ERADICATION THE ONLY REMEDY.

I think it necessary also, while I am on the subject of foot-and-mouth disease, to reiterate my views—and they are shared by the expert officers of the Department—as to the best method of combating this evil. I am led to do this because of certain facts that have come to my knowledge. There are two, and only two, possible courses of action. There is the continental plan of allowing the disease to run its course, and there is the plan of guarding against its occurrence and of resolutely stamping it out if it develops. I have seen nothing, and I have heard nothing, since I came to the Department, to alter my conviction that the safety of the Irish live stock industry lies in the policy of eradicating this terribly contagious disease immediately upon its appearance. That policy

may involve hardship. It may also involve expense. But the best policy is the most merciful and the cheapest in the end.

#### ECONOMIC CONDITION OF THE COUNTRY.

In closing what I have to say to-day to the Council, it is only right for me to make some reference to the general economic condition of the country. I feel I cannot truthfully hold that the people as a whole are suffering to any serious extent from the financial pressure occasioned by the war. Ireland is in the main an agricultural country, and it cannot be contended that our farmers are feeling the pinch to any degree. In fact it would be true if I affirmed that, making every allowance for the increased cost of production to which they are subject, our farmers have actually profited by the difficulties of the time. The price of agricultural produce of every kind has risen to unprecedented heights. And if we pass from this, the most important section of the community, to the artisan class, we have only to look at Belfast and other centres of industry, north and south, to see a corresponding wave of industrial prosperity. Employment is plentiful, wages are high, the standard of living has not gone down, and there has been no diminution in the comforts and amenities of life. But there can be little doubt that many of the old and the inefficient are in great straits, and that the misery of the very poor has been intensified by the increased cost of the necessaries of life. Of the other classes, the one that is being most adversely affected by war conditions consists of those who possess fixed incomes, whether coming from the State or from commercial and industrial sources. The rise in prices, and the growing burden of taxation, make life for this class a much harder problem than it has ever been in the past. A partial remedy for their troubles may, of course, be found in the adoption of an unsparing economy ; and I have the greatest sympathy with the work of those committees, whether appointed by the State or voluntarily constituted, who are preaching the doctrine of thrift and frugality. Such work, so needed and so neglected as it has been in the past, is of inestimable value at this time of crisis. But I am afraid it will be robbed of much of its effect if the Drink Bill of Ireland, which still exceeds £14,000,000 sterling per annum, is not correspondingly reduced. Amidst all the advice given to the people by the Press, by the social worker, by the statesman, and by the politician, this source of appalling extravagance and evil is seldom directly alluded to. The almost universal silence that prevails in regard to it, makes it all the more necessary for me, occupying the position that I do, to point to its existence, and to emphasise its disastrous results.

## THE RECLAMATION OF BOG LAND.

Owing to the present economic conditions, the question of increasing the area under tillage has assumed even more than its usual importance and accordingly the question can nothing be done to increase food supplies by reclaiming and cultivating a portion of the large areas of bog land in Ireland naturally presents itself. It may be said at once, however, that whatever the prospect in the future may be, of reclaiming these bogs, the present does not appear to be a propitious time to make a start on a scale that would have an effect in increasing the food supplies during the present or even the following year. As long as there are thousands of acres of second class grass land, which can be, but are not now tilled, it would be a waste of time and money to devote our available energies or resources to bog reclamation on a very large scale. While there are detached portions of bog that could be cropped without draining, any extensive area to be reclaimed would first require to be drained, and in all cases the land would require to be limed and the scrub cleared off. Moreover, the crops for the first year would have very little effect on the national food supply. The labour required for such reclamation could be much better employed on land that was reclaimed years ago, and is now slowly, but no less surely, going back to its original state. But though the present time is not a favourable one for commencing bog reclamation on an extensive scale, there is no reason, except perhaps the scarcity of potash, why the farmers who own a few acres on the margin of a bog, should not proceed to enlarge their holdings by reclaiming a small portion every year.

The reclamation of bog affords in this manner opportunities for enlarging a large number of uneconomic holdings, and at the same time adding to the wealth of the country.

With the object of obtaining information regarding the manurial treatment of unreclaimed bog, a series of pot experiments was started in 1913. After much valuable information

**Manurial**           tion had been obtained on the subject by this  
**Experiments.**   means, an experiment was put down in 1914 in  
the Bog of Allen, near Naas, Co. Kildare. The  
most striking fact disclosed by this test was the importance of lime. On the plots that received no lime rye died out after a brief struggle for existence, while rape was a complete failure, not a single plant managed to grow, the young rootlets being burnt up as soon as the seeds germinated.

The use of phosphatic manures however was found more important than lime in the case of the potato, and was decidedly more important than either nitrogen or potash for rye and rape. In all cases the nitrogen was more important than potash, except that the grain did not fill as well on the plot where the potash was absent. Again, the importance of using a complete mixture of artificials along with lime was clearly demonstrated.\*

The work was continued last year on similar lines, but on a larger scale. Raw peat from 6 different bogs was tested in pots, and plot experiments were made on two bogs; one near Fербane, King's Co., on the bog owned by the Turraun Péat Works; and the other in Co. Tyrone, near Lough Neagh, on the bog owned by Mr. Hamilton Robb, Portadown.

In the pot experiments the crop grown in each case was mustard. The accompanying illustrations show the results of three of the tests which are representative of all. The first pot, reading from left to right, contains bog in its original state. The next four received three of the following fertilisers, viz. :—nitrogen, phosphate, potash, and lime, while the sixth received the four ingredients. Out of the six tests in no case did a single plant grow on the untreated pots; as in the previous years they died as soon as the seeds germinated. In the case of the second pots that received all the ingredients except lime only two managed to get over ground and they made practically no growth afterwards. With two exceptions the influence of phosphate was more important than nitrogen, while it invariably happened that potash was the least important of the four ingredients. In this connection it may be mentioned that potash appears to be of less importance in the case of cruciferous crops and even other crops as long as the plants are producing stems and leaves only; but when it comes to the formation of grain or of tubers, the effect of potash is most marked. Owing to the impossibility of obtaining a supply of potash, this fact itself would render the reclamation of bog land on an extensive scale out of the question at the present time, except where sea-weed (or wrack), or farmyard manure is available.

An experiment was carried out on surface bog used for making peat moss litter, in King's Co. The heather and scrub were cut off, and the land dug over in the early spring. When the crops were put down on 30th April, the peat was so dry and spongy that it appeared doubtful if any crop could possibly grow.

\* See JOURNAL, Vol. xv., No. 4, pp. 724 *et seq.*

# RECLAMATION OF BOG LAND.

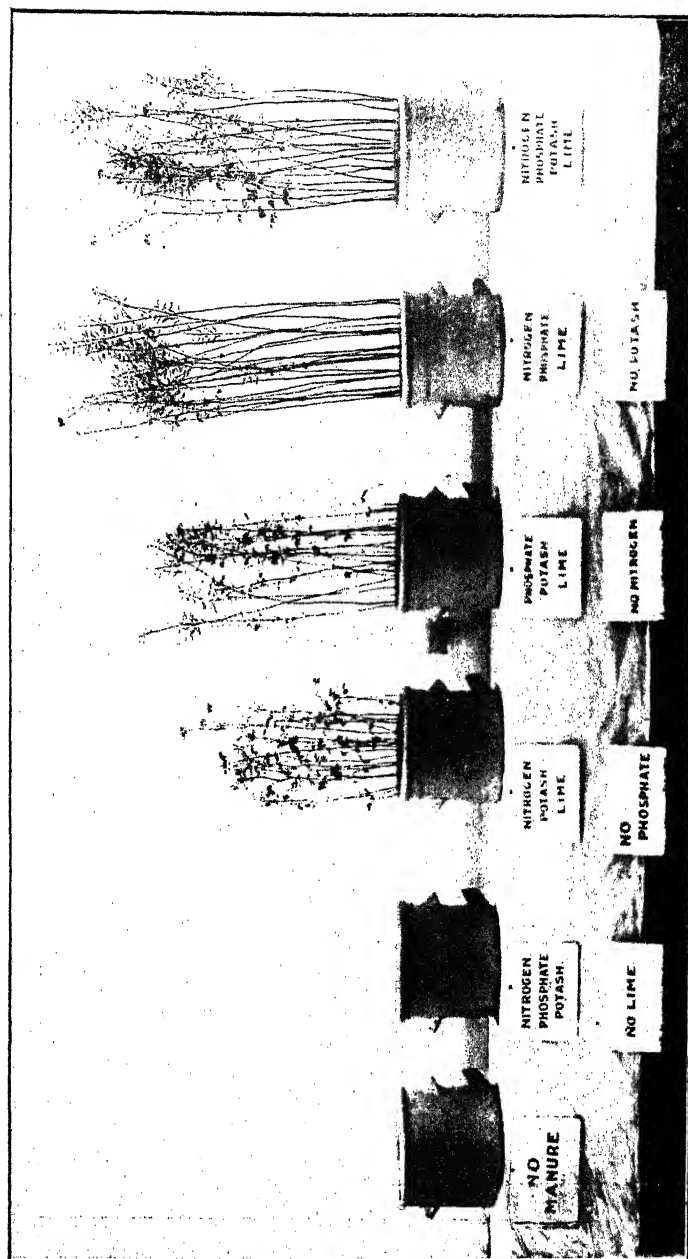
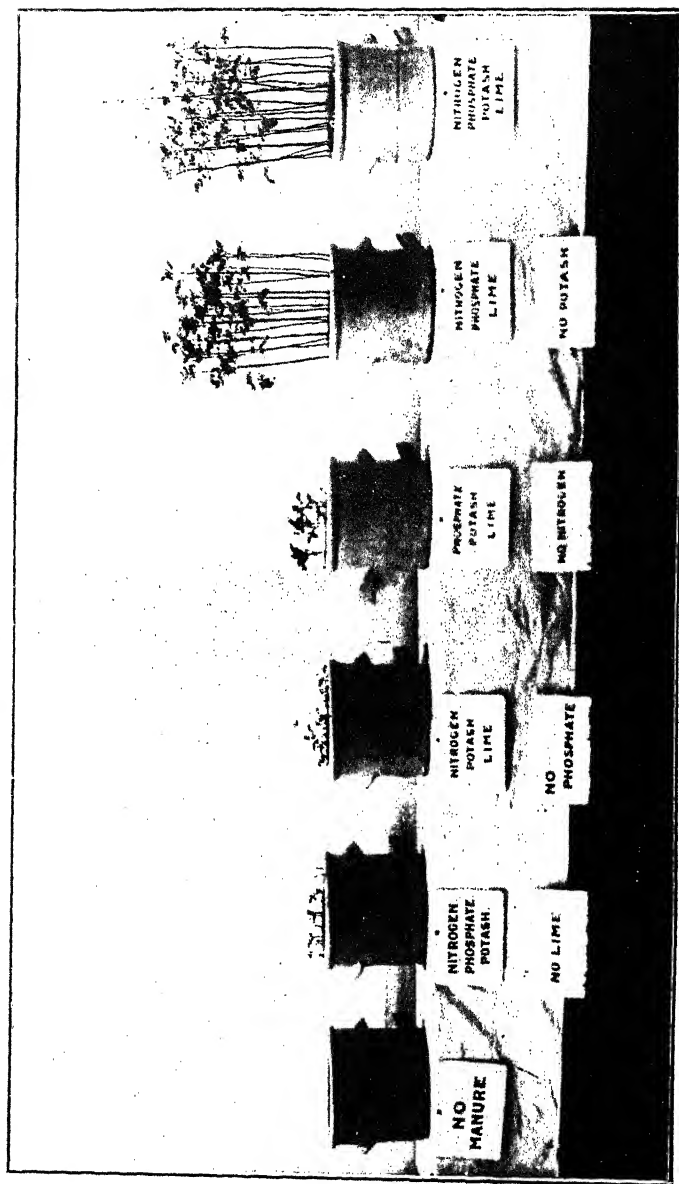


Fig. 1.—Pot Experiment:—Mustard grown on peat soil from near Carna.

# RECLAMATION OF BOG LAND.



1 2 3 4 5 6  
Fig. 2.—Pot Experiment:—Mustard grown on peat soil from near Mullaranny.

# RECLAMATION OF BOG LAND.

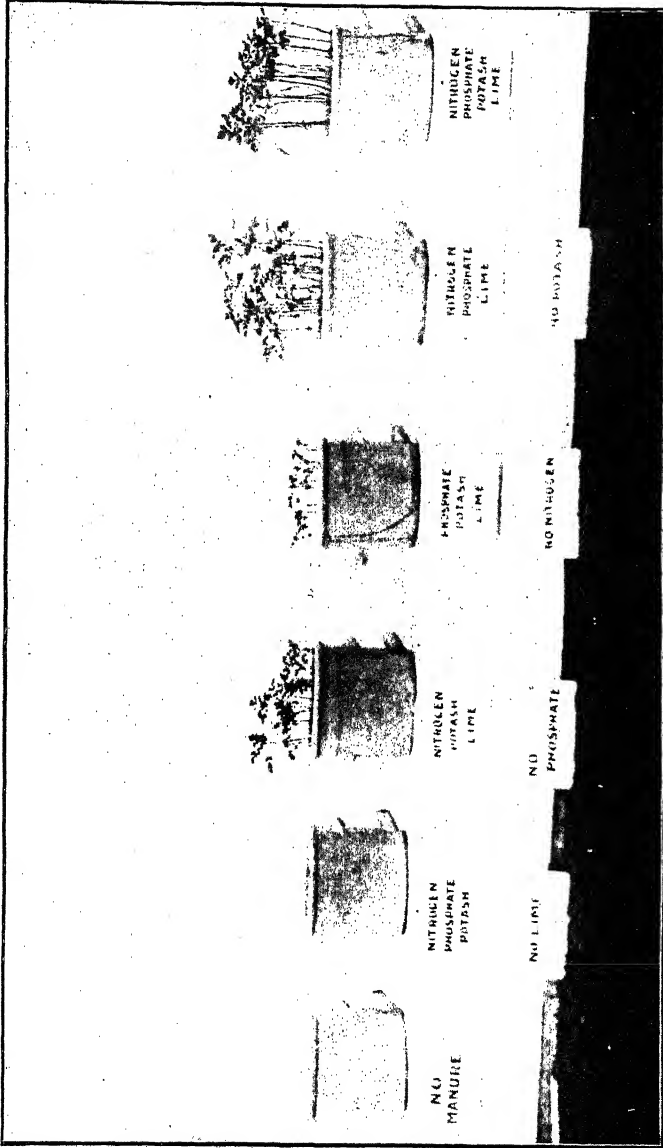


Fig. 3.—Pot Experiment:—Mustard grown on peat soil from near Ballyhaunis.

# RECLAMATION OF BOG LAND.

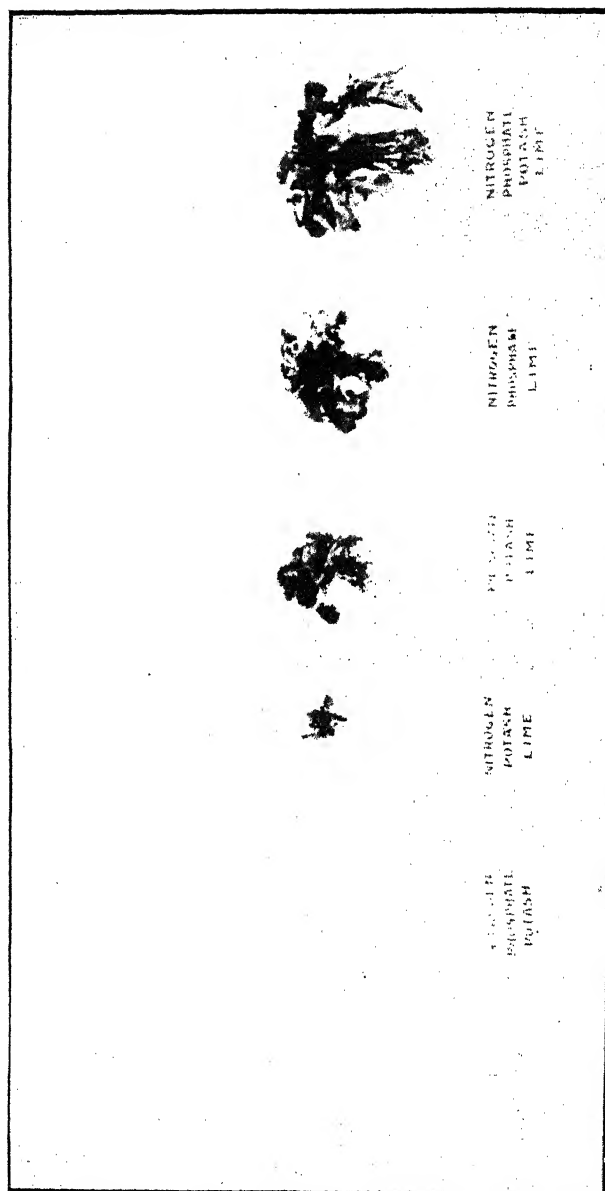


Fig. 4.—Rape grown on unreclaimed bog in King's County.



An analysis of the peat dried at 100 C. was as follows :—

†Organic Matter,	. . . . .	96.13 per cent.
Phosphoric Acid ( $P_2O_5$ ),	. . . . .	.16 „
Potash ( $K_2O$ ),	. . . . .	.04 „
Lime ( $CaO$ ),	. . . . .	.27 „

† Containing Nitrogen ( $N_2$ ), 1.43 per cent.

Six plots of  $\frac{3}{4}$  sq. perch each were prepared on similar lines to the pot experiments, viz. :—

- No. 1. Control—Neither lime nor manure.  
 „ 2. Nitrogen, phosphate and potash—No lime.  
 „ 3. Nitrogen, potash and lime—No phosphate.  
 „ 4. Phosphate, potash and lime.—No nitrogen.  
 „ 5. Nitrogen, phosphate and lime—No potash.  
 „ 6. Nitrogen, phosphate, potash and lime.

Manures were applied at the following rate per statute acre :—

- $\frac{3}{4}$  cwt. Nitrate of Soda.  
 $\frac{3}{4}$  „ Sulphate of Ammonia.  
 6 „ Superphosphate (35 %).  
 3 „ Kainit.  
 2 tons Burnt Lime.

Each plot was subdivided transversely into three plots of  $\frac{1}{4}$  sq. perch each.

The following crops were sown on 30th April :—Rape, rye, and potatoes.

The following plan shows how the plots and crops were arranged :—

RAPE.	RYE.	POTATOES.
No treatment	No treatment	No treatment
Nitrogen Phosphate Potash	Nitrogen Phosphate Potash	Nitrogen Phosphate Potash
Nitrogen Potash Lime	Nitrogen Potash Lime	Nitrogen Potash Lime
Phosphate Potash Lime	Phosphate Potash Lime	Phosphate Potash Lime
Nitrogen Phosphate Lime	Nitrogen Phosphate Lime	Nitrogen Phosphate Lime
Nitrogen Phosphate Potash Lime	Nitrogen Phosphate Potash Lime	Nitrogen Phosphate Potash Lime

The results obtained from the different crops and manures are shown in the accompanying illustrations. (See illustrations 4, 5 and 6.)

The rootlets of the rape on the untreated plot, and those on the plot that received no lime, appeared as if burnt up as soon as the seeds germinated, with the result, that not a single

**Rape.** plant managed to get over ground. The plot that received no phosphate made a fair braird, but a large number of the plants died out shortly afterwards. Those that survived were never larger than the size at which turnip plants are thinned, and they had a stunted unhealthy appearance. There was comparatively a great improvement in the plot that received no nitrogen. The want of potash was not nearly as marked as that of the other ingredients, but this plot was considerably behind the one that received a complete dressing of artificial manure and lime. All the plants that grew on the plots suffered from the dry season owing to the turfy, spongy nature of the surface and even Plot No. 6 made a very indifferent crop.

In the case of rye on the untreated plot the seed germinated and the young plants came up, but made very little growth afterwards.

**Rye.** The plot that received all the ingredients except lime produced a few stunted ears, which however developed no grain. The plot without phosphate was a little better, but produced only a small quantity of shrivelled grain. The absence of nitrogen did not show such marked results and the grain was of fair quality. The omission of potash was not noticed in the early stages of growth. At this stage indeed there was very little difference between the plot without potash and the plot that received a complete dressing, but when the ears were formed the difference was most marked. Not only did the plot without potash produce poor shrivelled grain but the straw did not stretch out, and was quite soft to the touch as if it had been thrashed, while the straw on the other plots was hard and firm. The plot that received a complete dressing of artificial manure and lime made a very good crop, both as to grain and straw, having regard to the time at which it was sown (30th April).

The following figures show approximately the total yield per acre of grain and straw combined :—

	T.	C.	Q.
No. 1. Untreated . . . . .	0	0	7
„ 2. Nitrogen, phosphate and potash, .	0	1	14
„ 3. Nitrogen, potash and lime, .	5	1	0
„ 4. Phosphate, potash and lime .	23	3	0
„ 5. Nitrogen, phosphate and lime, .	19	0	0
„ 6. Nitrogen, phosphate, potash and lime	33	3	0

# RECLAMATION OF BOG LAND.

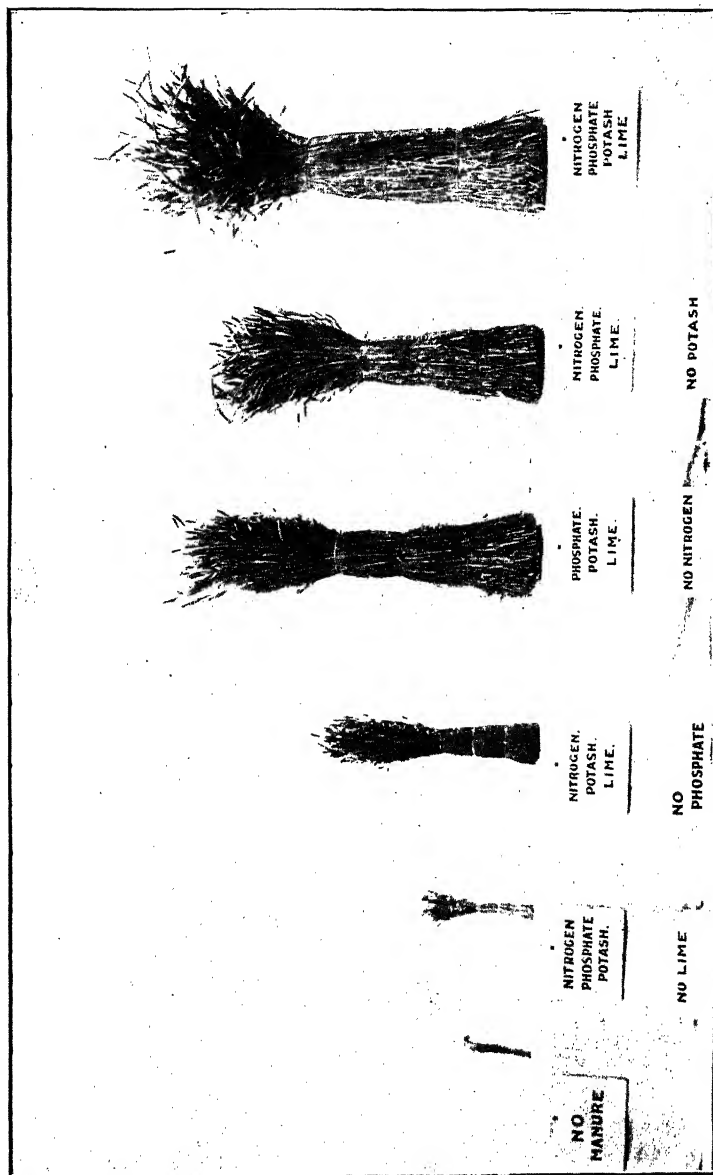


Fig. 5.—Rye grown on unreclaimed bog in King's County.

# RECLAMATION OF BOG LAND.

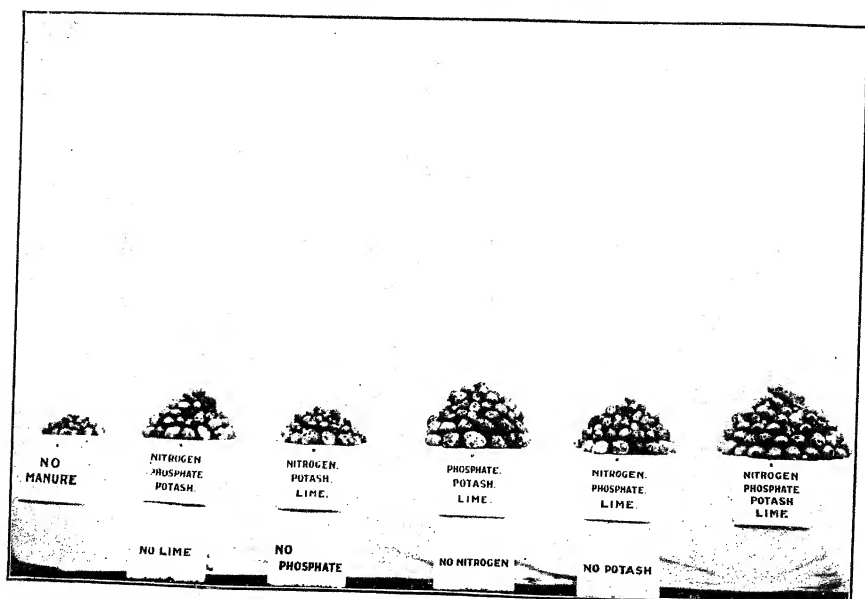


Fig. 6.—Potatoes grown on unreclaimed bog in King's County.

# RECLAMATION OF BOG LAND.

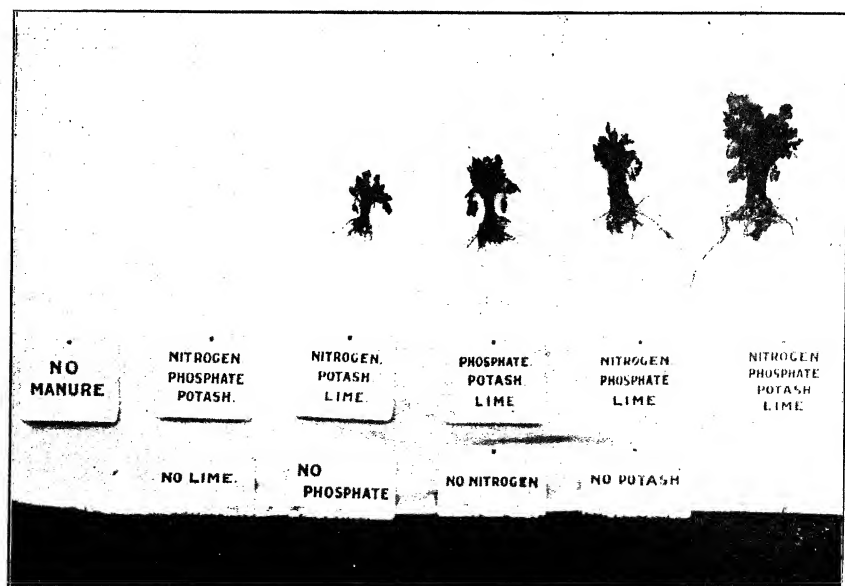


Fig. 7.—Rape grown on unreclaimed bog in Co. Tyrone.

# RECLAMATION OF BOG LAND.

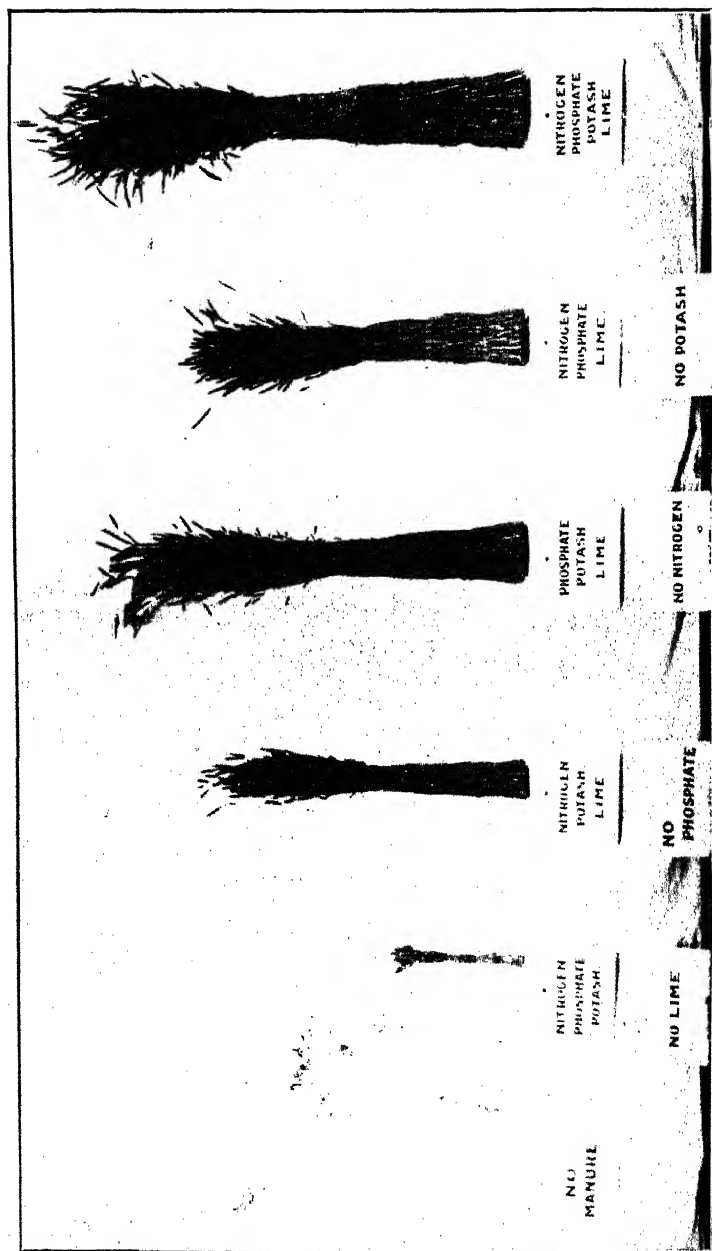


Fig. 8.—Rye grown on unreclaimed bog in Co. Tyrone.

In the potato experiment the variety grown was Arran Chief. The seed was slightly sprouted and planted whole. The crop was sprayed at the usual time. The tops were cut

**Potatoes.** down by frost on 19th June and again in autumn when they were still green and had a vigorous growth. This no doubt considerably reduced the crop, and had something to say to the difference in the yield between the sixth and the other plots, as at the time of the first frost the former was further advanced and suffered to a greater extent.

On the untreated plot only a few stalks appeared above ground but notwithstanding this all the potatoes produced more or less small tubers by the transference of food from the old to the young tubers. The plot without lime produced a better crop than the one that received no phosphate. This corroborates last year's experiment in Co. Kildare that the potato is less dependent on lime than either rape or rye on land of this description, and that a deficiency of phosphate is quite as great if not a greater drawback than is a deficiency of lime. After midsummer there was not much difference in the appearance of the last three plots, but when they were lifted the difference in the weight of the tubers was considerable. The want of potash was more marked than was the want of nitrogen, while the plot that received the complete dressing of artificial manure and lime was much better than either with a total yield of  $6\frac{1}{2}$  tons per statute acre. Although a large percentage of the tubers were undersized the yield must be considered very satisfactory considering the potatoes were cut down by frost on 19th June and thereby lost about three weeks growth. The following figures show approximately the yield per statute acre.

	T.	G.	Q.
No. 1. Untreated, . . . . .	0	8	2
„ 2. Nitrogen, phosphate and potash, . . . . .	2	8	3
„ 3. Nitrogen, potash and lime, . . . . .	1	7	1
„ 4. Phosphate, potash and lime . . . . .	4	5	3
„ 5. Nitrogen, phosphate and lime . . . . .	2	17	1
„ 6. Nitrogen, phosphate, potash and lime . . . . .	6	10	0

An experiment was carried out in Co. Tyrone on bog, the surface of which had been cut away to a depth of 5 or 6 feet some years previously. The heather was beginning to

**Co. Tyrone** re-assert itself. This was a fairly good black bog,  
**Experiment.** but the water table if anything was too near the surface. The analysis of the peat dried at 100 C.

was as follows:—

†Organic matter . . . . .	98.20 per cent.
Phosphoric Acid ( $P_2O_5$ ), . . . . .	0.119 „
Potash ( $K_2O$ ), . . . . .	0.025 „
Lime ( $CaO$ ), . . . . .	0.185 „

† Containing Nitrogen ( $N^3$ ), 1.58 per cent.

A comparison with the analysis of the Turraun bog, shows, that it contains more organic matter and consequently more nitrogen and less mineral matter. The bog was not dug over till the early spring, so that it had not much time to weather. The plots were arranged in exactly the same way as in King's Co. and the same crops were grown. The rye was sown on 16th April and the rape and potatoes on 12th May.

As regards rape, a comparison with the plots in King's Co. (compare illustrations 4 and 7) shows that there was practically no difference in the plots grown at the two centres, and the results are almost identical with those obtained in Co. Kildare the previous year.

#### Rape.

In the case of rye too the results were practically the same as those obtained in King's Co. (compare illustrations 5 and 8). The plot without potash had the same shrivelled grain, and soft straw. These two experiments differ slightly from the one in Kildare the previous year, where the lack of nitrogen more especially in the production of straw was quite as important as the lack of potash. The following figures show approximately the yield per statute acre of grain and straw combined.

	T.	C.	Q.
No. 1. Untreated,	0	0	7
„ 2. Nitrogen, phosphate and potash,	0	1	7
„ 3. Nitrogen, potash and lime,	4	1	0
„ 4. Phosphate, potash and lime,	19	1	0
„ 5. Nitrogen, phosphate and lime,	14	2	0
„ 6. Nitrogen, phosphate, potash and lime,.	28	1	0

Two varieties of potatoes were grown in each plot, viz. :—British Queen and Irish Queen. Unfortunately they were not sprayed and as both of these varieties are very subject to blight they were cut down early in the season before they made their full growth; moreover, rooks did more or less damage before the crop was lifted. For these reasons the results cannot be considered quite reliable. However, a comparison of the photos (compare illustrations 6 and 9) shows that they agree in several respects. In this case the lime was more important than the phosphate, and the nitrogen slightly more important than the potash.

The following figures show approximately the yield per statute acre :—

# RECLAMATION OF BOG LAND.

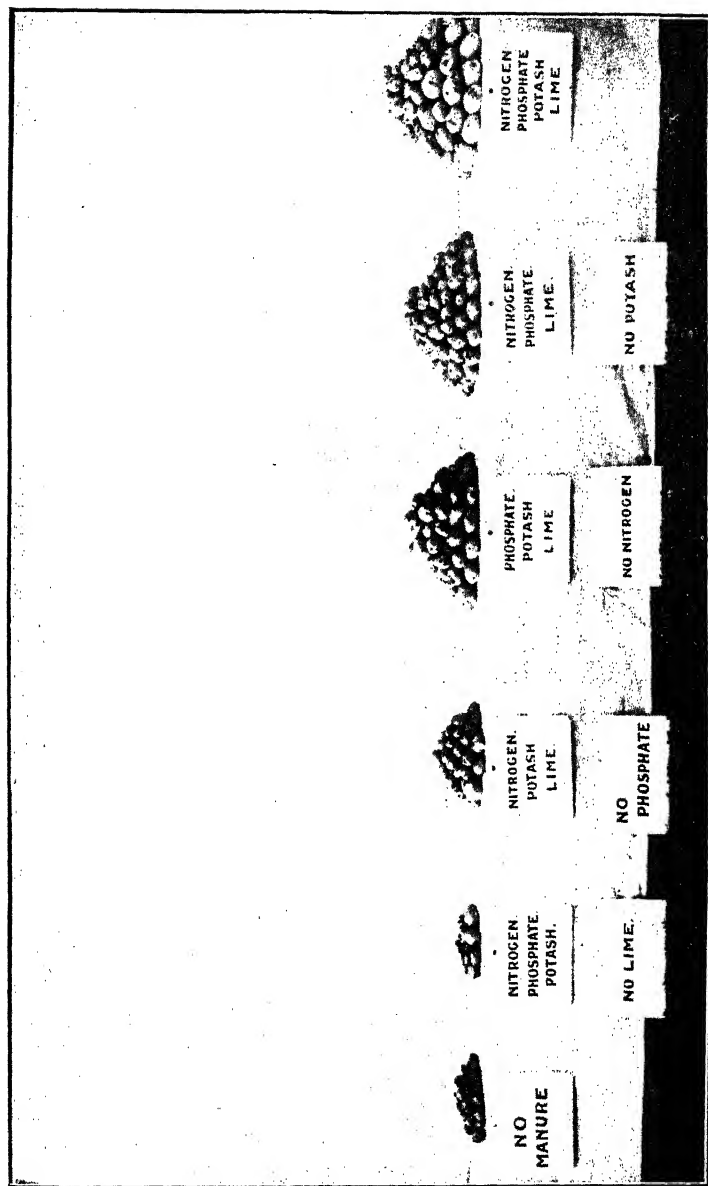


Fig. 9.—Potatoes grown on unreclaimed bog in Co. Tyrone.



RECLAMATION OF BOG LAND.

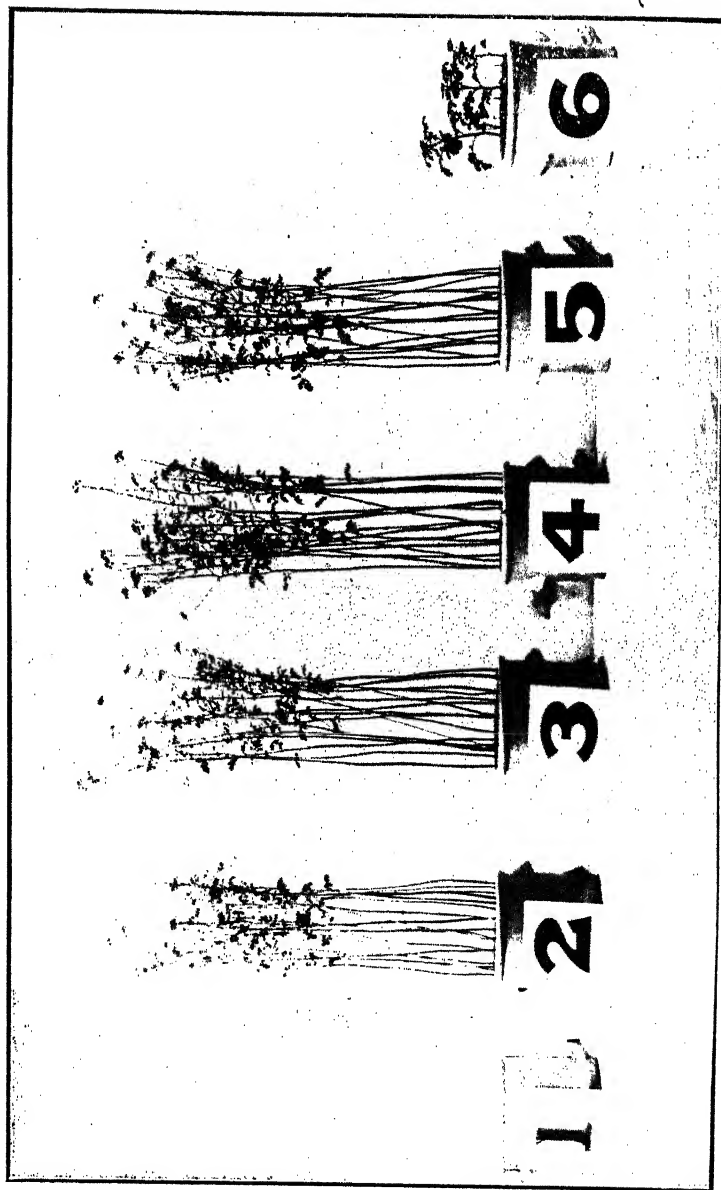


Fig. 10.—Pot Experiment. Mustard grown on peat soil.

	T.	C.	Q.
No. 1. Untreated, . . . . .	0	7	3
„ 2. Nitrogen, phosphate and potash . . . . .	0	5	3
„ 3. Nitrogen, potash and lime, . . . . .	1	5	3
„ 4. Phosphate, potash and lime, . . . . .	2	14	1
„ 5. Nitrogen, phosphate and lime, . . . . .	3	3	0
„ 6. Nitrogen, phosphate, potash and lime, . . . . .	4	13	0

From the results of both the pot and field experiments carried out during the last three years it is evident that lime is the “limiting factor” in the reclamation of the Irish bogs, in

**General** fact it appears useless to attempt their reclamation  
**Summary.** without lime. It is therefore of first importance that a supply of lime should be obtainable. While

some of the bogs are far removed from lime of any description there are other districts where although ordinary burnt lime cannot be procured supplies of marl or shell sand are available within carting distance. Phosphate is next in importance to lime. In the tests carried out it was applied in the form of superphosphate. It is quite possible however that basic slag or even ground North African mineral phosphate would have given as good results on land of this description and at less cost.

Notwithstanding the large amount of nitrogen in the peat, the necessity of supplying this ingredient in a form in which the plant can use it, was clearly demonstrated. After the lime has had time to act on the almost unexhaustible supplies of nitrogen in the peat, and bring it into an available form, it may be possible to reduce the amount of nitrogenous manures required.

As long as the different crops were producing leaf and stem only, potash was the least important of the four ingredients; but its influence was most marked in filling the grain and stiffening the straw in the case of the rye, and of increasing the yield of tubers in the case of the potato.

In order to obtain information regarding the value of shell sands and marls in the bog districts in the west, and to ascertain if they could replace burnt lime in the reclamation of

**Experiment** bogs, a series of pot experiments was made last  
**with Marls,** summer. The results, generally speaking, were  
**Shell Sands, etc.** most satisfactory (see illustration 10). The crop grown was mustard. The pots were filled with raw peat from one and the same bog, and each pot received the same quantity of nitrogen, phosphate, and potash. The following are particulars regarding the pots shown in the photograph.

- No. 1. Neither lime nor marl.
- „ 2. 1 oz. Burnt lime.
  - „ 3. 3 „ Marl from Lake Carra, near Castlebar.
  - „ 4. 3 „ Shell sand from Achill.
  - „ 5. 3 „ Peaty marl from near Mullaranny.
  - „ 6. 9 „ Gravelly sand and soil from pits near Ballycroy.

Several other marls and sands were tested besides the above with equally good results. Each pot contained  $12\frac{1}{2}$  lb. of peat which was sufficiently moist to enable the seed to germinate. The quantity of burnt lime used was therefore  $\frac{1}{2}$  per cent., the two marls and shell sand  $1\frac{1}{2}$  per cent., and the gravelly soil  $4\frac{1}{2}$  per cent.

The control as usual with cruciferous crops without lime was a complete failure. The marls and shell sand gave quite as good if not better results than the lime. The quantity used (three times the amount of lime) was quite as effective as the lime in correcting the acidity in the peat and acted as quickly from the very start. The soil from Ballycroy when treated with hydrochloric acid, showed that it contained only a very small quantity of lime. The amount used was therefore increased to three times that of the other marls. The results were very disappointing. This material had been used extensively on a reclaimed bog in the district. Whatever influence it might have had in consolidating, and otherwise improving the bog, it is quite evident that it contained insufficient lime, even when used in large quantities.

These results show that most of the marls and shells tested are quite as good as burnt lime. A further investigation regarding the action, manurial value, and quantity required, of other sands and marls in the bog districts will be made during the present year.

## FIELD EXPERIMENTS, 1915.

### I.—BARLEY.

There were only two series of Large Scale Experiments carried out in 1915, size of plots 1 acre each. Of these Experiments one was arranged to test the value of two new Hybrid barleys raised at Glasnevin against Archer 2 with the following result:—

#### EXPERIMENT I.

Variety.	Yield of Good Corn per Statute Acre.	Value of Good Corn per Statute Acre.	Total Value per Acre, including Screenings
Archer 2	Brls. Stns. 10 8	£ s. d. 12 12 0	£ s. d. 12 14 6
A X G 28	9 6½	11 5 9	11 8 9
A X S	13 6	16 1 9	16 4 0

Note :—Screenings valued at 1s. per stone.

The differences are very striking, whereas one of the new barleys fell below Archer, the other produced nearly 3 brls. per acre more grain and £3 9s. 6d. more money value. When comparing these figures with the experiments of former years the great increase of from 8s. to 9s. per brl. in the value of barley owing to the war must be borne in mind, but nevertheless the hybrid obtained by crossing Archer barley with Spratt seems eminently worthy of further tests and cultivation to increase quantity.

The other Experiment was a continuation of the comparison between Beavens 145 and Standwell Barley.

#### EXPERIMENT II.

Variety.	Yield of Good Corn per Statute Acre.	Value of Good Corn per Statute Acre.	Total Value per Acre, including Screenings.
Beavens 145	Brls. Stns. 9 12	£ s. d. 11 7 0	£ s. d. 11 15 0
Standwell	9 0	10 16 0	11 4 0

Beavens 145 is again superior in yield although not nearly so much as in 1914. It has however a better habit of growth than Standwell, being short necked and more erect. It does not break off at the neck like Standwell and some other wide-eared barleys. It also appeared free from blindness in the ears, which was quite noticeable in the Standwell.

The following Table shows the character of the soil and subsoil and previous crops at each centre.

Experimenter.	Character of Soil and Subsoil.	Previous Crops.
J. P. Kearney, Carlingford, Co. Louth.	Good drift loam. Subsoil—gravel and yellow clay.	1913—Oats. 1914—Roots.
O. McDowell, Marsh Farm, Dundalk.	Gravelly loam. Subsoil—gravel and clay.	1913—Barley. 1914—Turnips.

In addition to the above experiments much work has been done in connection with barley in the cages at both Ballinacurra and Glasnevin. In the former there have been three series of quantitative experiments, two of them to compare crosses between Archer and Goldthorpe and Archer and Spratt barleys with their parents and the third to compare Beavens 145 from seed grown at three different centres with a Cambridge hybrid and three of our Irish hybrids (two A X G and one A X S). Of the Archer-Goldthorpe crosses none proved superior to Archer and only one superior to Goldthorpe in yield, but of the Archer-Spratt crosses three show superiority to both parents. In the comparison between 145 and other hybrids, an Archer Goldthorpe cross takes highest place, and the Archer Spratt cross is inferior to 145. Such comparisons as these will need continuance for two or three years to establish the relative values of the new varieties.

In the Glasnevin cage there have been quantitative tests of

- (1) Archer 1, 2 and 4, the latter being a new selection of Archer.
- (2) A series of quantitative plots sown with seed of various stages of ripeness, and
- (3) A comparison of Beaven's 145 with Archer.

Examination of the results has not yet been completed.

The cultivations of pure lines of Archer 1, 2 and 4, Goldthorpe and Spratt barleys have been continued at Ballinacurra.

*Character of the Season 1915.*

The rainfall during the winter of 1914-15 was excessive and February was a particularly wet month, but March and April were fine and favoured the sowing of Spring cereals which was performed under excellent conditions. May was rather dry although there seemed to be sufficient rain about the middle of the month to maintain growth. In June unfortunately, drought prevailed to an injurious extent and affected the development of the corn crops, especially barley and oats. July was unprecedentedly wet with cold nights and a deficiency of sunshine. Many promising crops of barley and oats were badly laid and the constant wet caused much second growth from the roots. The adverse conditions of July were continued during the first half of August, but, fortunately, when the harvest appeared to be in great jeopardy, an improvement set in. The rest of August and first half of September proved favourable for harvest work and the crops were well secured without delay.

Barley was very deficient in yield, more so than for very many years. Such deficiency has not in the writer's memory ever been associated with a good seed bed and early promise of an average crop. It must be attributed to the check of the June drought followed by a prolonged period of abnormally cold and wet weather. Oats did not suffer as much as barley in yield while Winter wheat was on the whole a fair average crop, but Spring sown wheat was late in ripening and disappointing in many instances.

## II.—MEADOW HAY.

During the thirteen years 1901 to 1913 inclusive, experiments on the manuring of meadow hay were carried out. A complete report has already been published, but a summary of the results obtained for the whole period is reproduced in the following Table :—

Number of Centres, &c.	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 5.
	No Manure.	10 tons Farm-yard Manure.	1 cwt. Nitrate of Soda.	1 cwt. Nitrate of Soda, 2 cwt. Superphosphate.	1 cwt. Nitrate of Soda, 2 cwt. Superphosphate, 2 cwt. Kainit.
	Average yield per Statute Acre.				
1901 to 1913, 217 centres.	C. Q.	C. Q.	C. Q.	C. Q.	C. Q.
	33 0*	46 2	40 2	46 2	51 2
Value of Crop ; Hay at 2s. per cwt., - - -	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Average Cost of Manures, - - -	3 6 0	4 13 0	4 1 0	4 13 0	5 3 0
Value of Crop less cost of manures,	—	2 0 0	0 11 4	0 17 10	1 3 2
	3 6 0	2 13 0	3 9 8	3 15 2	3 19 10

\* Average of 250 weighings. At some centres this plot was weighed in duplicate.

The chief deduction drawn from these results was that a dressing of artificial manures known as the Standard Mixture consisting of :—

1 cwt. Nitrate of Soda	} per Statute Acre
2 cwt. Superphosphate	
2 cwt. Kainit	

is generally suitable for meadow land in Ireland. The application of these manures may be relied upon to give satisfactory results on all ordinary soils, not only as regards the yield of hay but also in respect of an increased growth of better quality after-grass.

The superphosphate and kainit should be applied before the end of February. These two manures may be mixed together but the mixture should then be spread without delay. The nitrate of soda should not be mixed with the other manures but should be applied separately about the end of March or the beginning of April.

Two other series of manurial experiments are in progress, viz. :—

I. Liquid Manure Experiments—to compare the value of liquid manure with (a) farmyard manure and (b) a complete mixture of artificial manures.

- II. Experiments on Peaty Soils—to ascertain whether any advantage would be gained in varying the standard mixture by (a) the substitution of basic slag for superphosphate, (b) a reduction in the quantity of nitrate of soda, or (c) the omission of nitrate of soda.

### I.—LIQUID MANURE EXPERIMENTS.

This series has been repeated each year since it was commenced in 1911. During the past season experiments were carried out by Agricultural Instructors at 3 centres in 2 counties, and by Agricultural Overseers at 59 centres in Congested Districts.

A summary of the results obtained in 1915 and the four previous years is shown in the following Table :—

Plot.	Manures applied per Statute Acre.	1915. (62 Centres.)			1911-14. (249 Centres.)		
		Average yield of Hay per Statute Acre.	Increase due to Manures.		Average yield of Hay per Statute Acre.	Increase due to Manures.	
		T. C. Q.	T.	C. Q.	T. C. Q.	T.	C. Q.
1	No Manure, . . .	2 1 0	—		2 1 0	—	
2	16 tons Farmyard Manure,	2 16 2	0	15 2	2 16 3	0	15 3
3	16 tons Liquid Manure, .	2 16 2	0	15 2	2 17 3	0	16 3
4	1 cwt. Nitrate of Soda, 2 cwt. Superphosphate, 2 cwt. Kainit, }	2 17 1	0	16 1	2 16 3	0	15 3

In each of the past five seasons as good results have been obtained from the application of a heavy dressing of liquid manure as from the same weight of farmyard manure.

This affords striking testimony of the value of liquid manure for the hay crop, and it may be mentioned that the returns from the individual centres show that equally good results are obtained when the liquid is applied to first-crop, second crop or permanent meadow.

Few agriculturists appear to realize how valuable liquid manure is as a fertiliser and what benefits might be derived from collecting and applying it to farm crops and especially to grass land either for meadow or pasture.



## II.—EXPERIMENTS ON PEATY SOILS.

The results of previous experiments have made it possible to recommend with confidence a standard mixture of artificial manures for the meadow hay crop on average soils.

This series of experiments is confined to peaty soils in order to ascertain if any advantage would be gained by varying the standard mixture for the meadow hay crop on such soils.

As a result of data obtained from preliminary tests in 1912 and 1913 an experiment was carried out in 1914 and repeated in 1915 to test the effects of the application of nitrate of soda along with a dressing of basic slag and kainit, and also to compare the standard mixture with a similar dressing in which basic slag was substituted for superphosphate. All the manures were applied in spring.

The following Table shows the nature and results of the tests :—

Name and Address of Farmer	Per- centage of Organic Matter (Depart- ment's Analysis)	Plot 1.  No Manure	Plot 2.  2 cwt. Basic Slag, 2 cwt. Kainit	Plot 3.  ½ cwt. Nitrate of Soda, 2 cwt. Basic Slag, 2 cwt. Kainit.	Plot 4.  1 cwt. Nitrate of Soda, 2 cwt. Basic Slag, 2 cwt. Kainit.	Plot 5.  1 cwt. Nitrate of Soda, 2 cwt. Super- phosphate, 2 cwt. Kainit.
S. C. Morrison, Derryadd, Co. Fermanagh	21.45	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.
J. Kavanagh, Kildangan, Co. Kildare	20.64	1 8 3	2 4 1	2 5 2	2 9 3	2 10 2
J. Cribbin, Rathangan, Co. Kildare	13.01	1 18 2	2 9 1	2 8 1	2 5 0	2 6 0
S. Roe, J.P., Roscrea, King's Co.	27.79	2 6 2	2 13 2	2 13 0	3 6 0	2 14 1
P. Brehany, Carracastle, Co. Mayo	23.72	1 3 1	1 5 2	1 7 2	1 12 3	1 15 1
		2 6 0	2 17 0	2 18 0	2 19 0	3 13 0
Average yield per statute acre,	—	1 18 2	2 6 0	2 6 2	2 10 2	2 9 3
Increase due to Manures,	—	—	0 7 2	0 8 0	0 12 0	0 11 1
	—	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Cost of Manures,	—	—	0 13 0	0 19 0	1 5 0	1 5 0
Value of Crop less cost of Manures; Hay at 2s. per cwt.	—	3 17 0	3 19 0	3 14 0	3 16 0	3 14 6
Do. do. for 1914 (13 centres),	—	2 16 0	3 4 6	3 7 0	3 7 0	3 10 0

The same price per ton has been charged for each of the manures as in 1914, viz. :—nitrate of soda, £12; superphosphate, £3 10s.; basic slag, £3 10s.; kainit, £3. In 1915, however, owing to the war the actual cost of nitrate of soda was rather more than £12 per ton, while kainit was much dearer and practically unobtainable by farmers.

The most noticeable feature of the average results for 1915 is the small increase in yield resulting from the inclusion of nitrate of soda in the mixtures applied to plots 3, 4 and 5. In only one case, namely,

plot 2, from which nitrate of soda was omitted, has the value of the increase been sufficient to pay for the manures applied. These results which may be due to the long period of dry weather experienced in the spring are not in accordance with those of 1914, the average figures for which are shown in the table. It is worth noting, however, that at four centres out of five the standard mixture applied to plot 5 has given a heavier yield than the mixture applied to plot 4 in which the superphosphate was replaced by basic slag. In this respect the results confirm those of the previous year. Until, therefore, further experiments have been carried out which may indicate a more suitable mixture farmers cannot do better than continue to apply the standard mixture to meadow hay on peaty soils.

#### THE MANURING OF PASTURE LAND.

There is no doubt that the application of a phosphatic manure to much of the second-rate grazing land of this country would give profitable returns. Either basic slag or superphosphate can generally be relied upon to give good results. In every county in Ireland the value of basic slag has been demonstrated, particularly on damp or moory land growing coarse, sour herbage, not readily eaten by stock. On such pastures farmers need have no hesitation in applying basic slag at the rate of about 8 cwt. per statute acre, and no further dressing will be required for several years. On lighter and drier soils more certain results will be obtained from the use of superphosphate, and under normal conditions the addition of kainit is recommended. These two manures may be purchased separately, and mixed together in equal parts, 4 cwt. of the mixture being applied per statute acre. This dressing, however, should be repeated every second or third year. The application of liquid manure in March or April will effect a very marked improvement on practically all classes of pasture.

## III.—POTATOES.

## I.—MANURIAL TEST (OLD SERIES).

The first series of experiments carried out by the Department on the manuring of potatoes was commenced in 1901 and brought to a close in 1911. The tests were made in every county in Ireland on a variety of soils and with practically all the best known maincrop potatoes. The experiments were repeated for 11 consecutive years during which period seasons differing widely in character were experienced. The results are very briefly summarised in the following Table :—

Year.	No. of Experiments.	Plot 1. No Manure.	Plot 2. 15 Tons Farm-yard Manure.	Plot 3. 20 Tons Farm-yard Manure.	Plot 4. 15 Tons Farmyard Manure, 1 cwt. Sulphate of Ammonia.	Plot 5. 15 Tons Farmyard Manure, 1 cwt. Sulphate of Ammonia, 4 cwt. Superphosphate.	Plot 6. 15 tons Farmyard Manure, 1 cwt. Sulphate of Ammonia, 4 cwt. Superphosphate, 1 cwt. Muriate of Potash.	Plot 7. 15 Tons Farmyard Manure, 1 cwt. Sulphate of Ammonia, 4 cwt. Superphosphate, 1 cwt. Sulphate of Potash.
Average Yield per Statute Acre.								
		T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
1901	17	4 4	9 15	10 13	10 16	11 12	12 1	—
1902	23	4 7	7 19	8 18	8 19	9 16	10 11	—
1903	20	3 1	7 9	8 2	8 6	9 10	10 5	—
1904	32	3 12	7 16	8 14	8 10	9 9	10 9	—
1905	33	4 13	9 1	10 3	9 16	10 5	11 5	—
1906	37	3 12	7 6	7 19	7 17	8 16	9 18	9 13
1907	59	3 12	7 13	8 11	8 14	9 9	10 5	10 3
1908	49	4 9	9 0	9 13	9 19	10 14	11 14	11 9
1909	32	4 4	8 9	9 7	9 10	10 2	10 19	10 18
1910	32	4 7	8 12	9 15	9 12	10 14	11 10	11 5
1911	19	4 3	8 9	9 6	9 7	10 3	10 18	10 15
Average Total Yield,		4 0	8 4	9 2	9 3	9 19	10 17	*10 12
Average Yield of Small Potatoes,		1 3	1 8	1 11	1 11	1 13	1 12	1 17
Value of Crop, Saleable at 2s. per cwt., Small at 1s. per cwt.,		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Cost of Manures,		6 17 0	15 0 0	16 13 0	16 14 0	18 5 0	20 2 0	19 7 0
Value of Crop, after deducting Cost of Manures,		—	3 0 9	4 0 0	3 13 8	4 6 0	4 16 5	4 17 1
Cost of Manures,		6 17 0	12 0 0	12 13 0	13 0 4	13 19 0	15 5 7	14 9 11

\* Average of 228 centres only.

The returns were so remarkably uniform throughout the series that it is possible to recommend with the utmost confidence a standard mixture of artificial manures composed of :—

1 cwt. Sulphate of Ammonia, }  
 4 cwt. Superphosphate, } per Statute Acre,  
 1 cwt. Muriate of Potash, }

for use along with a moderate dressing of farmyard manure.

The artificial manures may be mixed together and applied on the farmyard manure in the drills before the seed potatoes are planted.

This mixture of artificial manures is also suitable for potatoes grown without dung but in such circumstances the quantities should be increased by one-half.

## II.—MANURIAL TEST (NEW SERIES).

The results of the Old Series of experiments proved that a satisfactory manurial dressing for the potato crop consists of a moderate quantity of farmyard manure in conjunction with the complete mixture of artificials quoted above. Whilst this mixture had proved eminently satisfactory, it was thought desirable to ascertain to what extent, if any, the quantity of each of the three manurial ingredients might be modified, and with this object in view a new series of experiments was commenced in 1908.

In these tests the same three manures, sulphate of ammonia, superphosphate and muriate of potash, were applied to each plot in addition to a moderate dressing of farmyard manure, but the quantity of each artificial manure was varied.

This experiment has now been brought to a close. In 1915 these tests were carried out at 44 centres in 23 counties. For convenient reference and comparison, the average results for 1915, and also for the whole period of eight years, 1908-15, are summarised briefly in the following Tables.

In each Table, plot No. 3, manured with the standard mixture of artificials, viz., 1 cwt. sulphate of ammonia, 4 cwt. superphosphate, 1 cwt. muriate of potash, forms the basis of comparison for the remainder of the plots.

### (a) Varying quantities of Superphosphate.

Plot.	Manures applied per Statute Acre.	1915. (44 Centres.)			Average of eight years 1908-15. (359 Centres.)		
		Average total yield per Statute Acre.	Average value of Crop less cost of Manures.		Average total yield per Statute Acre.	Average value of Crop less cost of Manures.	
		T. C.	£ s. d.		T. C.	£ s. d.	
2	3 cwt. Superphosphate with Dung, Sulphate of Ammonia and Muriate of Potash,	11 19	17 11 0		10 19	15 6 6	
3	4 cwt. Superphosphate, do.,	12 8	18 5 6		11 6	15 17 1	
4	5 cwt. Superphosphate, do.,	12 4	17 15 0		11 6	15 14 2	

## (b) Varying quantities of Sulphate of Ammonia.

Plot.	Manures applied per Statute Acre.	1915. (44 Centres.)		1908-15. (359 Centres.)	
		Average total yield per Statute Acre.	Average value of Crop less cost of Manures.	Average total yield per Statute Acre.	Average value of Crop less cost of Manures.
		T. C.	£ s. d.	T. C.	£ s. d.
3	1 cwt. Sulphate of Ammonia, with Dung, Superphosphate and Muriate of Potash, .	12 8	18 5 6	11 6	15 17 1
5	1½ cwt. Sulphate of Ammonia, do., .	12 4	17 10 9	11 8	15 15 2
6	2 cwt. Sulphate of Ammonia, do., .	12 12	17 17 0	11 14	15 17 1

## (c) Varying quantities of Muriate of Potash.

Plot.	Manures applied per Statute Acre.	1915. (44 Centres.)		1908-15. (359 Centres.)	
		Average total yield per Statute Acre.	Average value of Crop less cost of Manures.	Average total yield per Statute Acre.	Average value of Crop less cost of Manures.
		T. C.	£ s. d.	T. C.	£ s. d.
3	1 cwt. Muriate of Potash, with Dung, Superphosphate and Sulphate of Ammonia, .	12 8	18 5 6	11 6	15 17 1
7	1½ cwt. Muriate of Potash, do., .	12 9	18 2 0	11 14	15 18 2
8	2 cwt. Muriate of Potash, do., .	12 8	17 15 6	11 12	15 17 7

Since 1912 an extra plot, No. 9, has been included in the experiments with the object of showing the effects of the application of three-quarters of the amount of the standard dressing of artificials applied on plot 3.

The following Table shows the returns obtained from dung alone, dung and three-quarters of the standard dressing of artificials, and dung with the full quantity of artificials, respectively:—

## (d) Varying quantities of the Standard Mixture.

Plot.	Manures applied per Statute Acre.	1915. (44 Centres.)		Average of four years 1912-15. (182 Centres.)	
		Average total yield per Statute Acre.	Average value of Crop less cost of Manures.	Average total yield per Statute Acre.	Average value of Crop less cost of Manures.
		T. C.	£ s. d.	T. C.	£ s. d.
1	15 tons Farmyard Manure,	9 9	14 10 0	8 13	12 14 9
9	15 tons Farmyard Manure, 4½ cwt. Standard Mixture of Artificials (½ dressing),	11 16	17 11 8	10 12	15 2 5
3	15 tons Farmyard Manure, 6 cwt. Standard Mixture of Artificials (Full dressing),	12 8	18 5 6	11 6	15 18 4

The same prices per ton were put upon the artificial manures as in 1914, viz. :—superphosphate, £3 10s. ; basic slag, £3 10s. ; sulphate of ammonia, £15 10s. ; nitrate of soda, £12 ; muriate of potash, £11.

In calculating the value of the crop the saleable potatoes have been taken at 2s. per cwt., and the small potatoes at 1s. per cwt. It should be noted, however, that owing to the war the cost of sulphate of ammonia and nitrate of soda was somewhat higher than the prices charged, while muriate of potash was much dearer and practically unobtainable.

From the commencement, the results of this New Series of experiments have been very uniform. The average returns from 359 centres for the whole period of eight years show clearly that as a rule no advantage is gained by applying any one of the three manures, superphosphate, sulphate of ammonia, and muriate of potash in greater quantities than those recommended in the standard mixture. In both 1915 and the previous year the greatest profit has been obtained on plot 3 to which the standard mixture was applied.

Not only do these results show that an increase in the quantity of any of the three ingredients is not desirable but they also demonstrate that the full dressing of 6 cwt. of the complete mixture is more profitable than the lighter dressing of 4½ cwt. Moreover, it may be noted that in comparison with the dressing of 4 cwt. applied to plot 3 the dressing of 3 cwt. superphosphate applied to plot 2 has invariably brought about a reduced yield and a smaller profit.

In view of the uniformity of the results from year to year and of the large number of centres at which the tests have been carried out.

the Department are satisfied that under normal conditions, where a moderate dressing of dung is applied to land of average quality, farmers will not find it necessary to make any change in the standard mixture.

### III.—MANURIAL TESTS ON PEATY SOILS.

In view of the large area of potatoes which is grown on peaty land, and the limited number of manurial experiments which hitherto had been carried out on such soils the Department, after conducting preliminary tests in 1912 and 1913, arranged an experiment in 1914 which was repeated in 1915, with the object of obtaining definite information on the following points :—

- (a) The effect of the application of the standard mixture of artificial manures, viz. :—1 cwt. sulphate of ammonia, 4 cwt. superphosphate, and 1 cwt. muriate of potash, along with farmyard manure as compared with dung alone.
- (b) The effect of (1) reducing the quantity of sulphate of ammonia to  $\frac{1}{2}$  cwt. per acre, and (2) of omitting it entirely from the mixture.
- (c) The effects of various mixtures of artificial manures applied alone.

The detailed results are given in Table I. on pages 258-9, but a reference to the summary Table below will show the nature of the experiment and the average results obtained from 16 centres in 15 counties in 1915, as well as the corresponding figures for the previous year.

## MANURIAL TESTS ON PEATY SOILS.

## Summary of Results.

Plot.	Manures applied per Statute Acre.	1915 (16 Centres)			1914 (17 Centres)		
		Average total Yield per Statute Acre	Average value of Crop less cost of Manures	Average total Yield per Statute Acre	Average value of Crop less cost of Manures	Average total Yield per Statute Acre	Average value of Crop less cost of Manures
1	15 tons Farmyard Manure, .	T. C. 10 0	£ s. d. 15 13 0	T. C. 8 8	£ s. d. 11 14 0		
2	15 tons Farmyard Manure, . ) 1 cwt. Sulphate of Ammonia, . ) 4 cwt. Superphosphate, . ) 1 cwt. Muriate of Potash, . )	12 4	17 17 6	10 16	14 5 6		
3	15 tons Farmyard Manure, . ) ½ cwt. Sulphate of Ammonia, . ) 4 cwt. Superphosphate, . ) 1 cwt. Muriate of Potash, . )	11 14	17 6 3	10 12	14 9 3		
4	15 tons Farmyard Manure, . ) 4 cwt. Superphosphate, . ) 1 cwt. Muriate of Potash, . )	11 8	17 3 0	10 5	14 7 0		
5	1½ cwt. Sulphate of Ammonia, . ) 6 cwt. Basic Slag, . ) 1½ cwt. Muriate of Potash, . )	10 14	16 19 3	9 12	14 8 3		
6	1½ cwt. Nitrate of Soda, . ) 6 cwt. Basic Slag, . ) 1½ cwt. Muriate of Potash, . )	10 3	16 1 6	9 8	14 2 6		
7	1½ cwt. Nitrate of Soda, . ) 6 cwt. Superphosphate, . ) 1½ cwt. Muriate of Potash, . )	10 11	16 17 6	10 3	15 6 6		
8	1½ cwt. Sulphate of Ammonia, . ) 6 cwt. Superphosphate, . ) 1½ cwt. Muriate of Potash, . )	10 18	17 9 3	10 8	15 11 3		

It is not proposed at this stage to attempt to draw definite conclusions, but the following notes regarding the results so far obtained may be of interest :—

- (1) In both 1915 and 1914 the heaviest yield, and in 1915 the greatest profit also, have been obtained from plot 2 to which the standard mixture of artificials was applied along with a moderate dressing of farmyard manure.
- (2) The reduction of the sulphate of ammonia in the standard mixture or its total omission therefrom has resulted in both years in a lower yield and also in the past season in a slightly smaller profit.
- (3) Very satisfactory crops have been grown by the use of artificial manures alone. In 1914 the highest average net



return, and in 1915 the second highest return per acre were obtained from plot 8 to which the standard mixture was applied alone at the rate of 9 cwt. per statute acre.

- (4) In both years in combination with other artificial manures basic slag has given inferior results to superphosphate, and nitrate of soda has proved less satisfactory than sulphate of ammonia.

#### IV.—MANURIAL TESTS WITH SEAWEED.

During the past four years tests have been made with potatoes in sea-board localities in order to determine:—

- (a) The relative values of seaweed and farmyard manure,  
(b) The most suitable artificial manures to use in conjunction with seaweed.

In estimating the returns from the different plots seaweed has been valued at 3s. per ton. Detailed results are given in Table II. on pages 260-1, but a summary of the returns for 1915 and the three previous years is shown in the following Table:—

#### MANURIAL TESTS WITH SEAWEED.

##### Summary of Results.

Plot.	Manures applied per Statute Acre.	1915. (8 Centres.)			Average of Three Years, 1912-14. (31 Centres.)		
		Average total yield per Statute Acre.		Average value of Crop less cost of Manures.	Average total yield per Statute Acre.	Average value of Crop less cost of Manures.	
1	15 tons Farmyard Manure,	T. 12 C. 11	£ 20 s. 18 d. 0	T. 9 C. 19	£ 14 s. 15 d. 4		
2	15 tons Seaweed,	11 5	19 0 0	8 18	13 17 2		
3	15 tons Seaweed, 1 cwt. Sulphate of Ammonia 4 cwt. Superphosphate, 1 cwt. Muriate of Potash.	14 19	24 6 6	12 3	17 17 8		
4	15 tons Seaweed, 4 cwt. Superphosphate, 1 cwt. Muriate of Potash.	13 14	22 13 0	11 1	16 11 11		
5	15 tons Seaweed, 1 cwt. Sulphate of Ammonia 4 cwt. Superphosphate.	14 4	23 10 6	11 17	17 19 11		
6	15 tons Seaweed, 4 cwt. Superphosphate.	13 5	22 6 0	10 16	16 13 10		

The results have been very uniform throughout the series, and they seem to indicate that

- (1) Weight for weight seaweed does not produce as heavy a crop of potatoes as farmyard manure.
- (2) While in each of the past two seasons the application of the standard mixture of artificials along with seaweed has given the highest average net return per acre, in many cases muriate of potash might be omitted from the mixture without any substantial reduction in the profits.

#### V.—THE STANDARD MIXTURE.

- 1 cwt. Sulphate of Ammonia,  
4 cwt. Superphosphate,  
1 cwt. Muriate of Potash.

In the report for 1914 attention was directed to the fact that in each of the three Series of manurial experiments in that year the highest average net return per acre was obtained from the plot to which the standard mixture was applied. Exactly similar results have been obtained during the past season.

The Department cannot too strongly urge upon farmers the desirability of using this well-balanced mixture when they require artificial manures for potatoes.

#### VI.—VARIETY TEST.

This experiment, designed to test the relative cropping capacities of different varieties of potatoes, was conducted at 41 centres in 28 counties by Agricultural Instructors, and by Agricultural Overseers at 49 centres in Congested Districts.

The results of these tests in 1915 are summarised in the following Tables.

##### (a)—County Experiments.

Variety of Potato.	Saleable.		Small and Diseased.		Total.	
	T.	C.	T.	C.	T.	C.
<b>MAINCROP VARIETIES—</b>						
Summit, . . . . .	12	4	1	12	13	16
Up-to-Date, . . . . .	11	14	1	10	13	4
Arran Chief, . . . . .	11	14	1	8	13	2
Arran's Hope, . . . . .	11	14	1	5	12	19
Shamrock, . . . . .	11	0	1	6	12	6
Irish Queen . . . . .	10	4	1	5	11	9
Champion, . . . . .	8	18	2	10	11	8
<b>MID-SEASON VARIETIES—</b>						
Abundance, . . . . .	10	12	1	17	12	9
British Queen, . . . . .	10	4	1	17	12	1

*(b)—Congested District Experiments.*

Variety of Potato.	Saleable.	Small.	Diseased.	Total.
	T. C.	T. C.	T. C.	T. C.
Summit, . . . . .	12 19	1 4	0 3	14 6
Arran Chief, . . . . .	12 10	1 6	0 4	14 0
Up-to-Date, . . . . .	12 9	1 3	0 6	13 18
Northern Star . . . . .	11 7	1 17	0 6	13 10
Arran's Hope, . . . . .	11 13	1 2	0 6	13 1
Champion, . . . . .	9 5	1 19	0 13	11 17
Irish Queen, . . . . .	10 6	1 0	0 3	11 9

*Remarks.*

As in 1913 Summit produced the heaviest yield in both these series of experiments. In addition to yielding well this is probably the best disease resister of all the varieties tested. As regards cooking quality, however, it cannot be regarded as satisfactory. Summit is a white potato oval or round in shape but in a number of cases the tubers are stated to have been most uneven and somewhat coarse.

Up-to-Date is now too well known to require description.

Arran Chief is the most promising of all the varieties of recent introduction. The tubers are white, and round in shape; the cooking quality almost without exception is described as good. The yield is much above average and the variety is more resistant to disease than most of those which are now grown in this country.

Of the other varieties tested it may be noted that Irish Queen continues to produce a considerably heavier crop of saleable potatoes than Champion. The cooking quality of Irish Queen is good and as it resists disease better than Champion it can with confidence be recommended in preference to that variety.

## VII.—SPROUTING SEED POTATOES.

*Late Varieties.*

During the past season, these experiments were carried out in 8 counties at 28 centres. At each centre the tests were made under similar conditions as to soil, manuring, variety, and cultivation.

the only difference being that the seed for one plot was sprouted (as explained in the Department's leaflet No. 58) and the seed for the other plot was not. The average results were as follows :—

County.	No. of Experiments.	Average Yield per Statute Acre.						Average gain in Yield due to Sprouting.
		Sprouted.			Unsprouted.			
		Saleable.	Small.	Total.	Saleable.	Small.	Total.	
		T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
Armagh, . . . . .	6	10 14	1 6	12 0	8 16	1 3	9 19	2 1
Cork, . . . . .	3	11 8	1 18	13 6	9 3	1 9	10 12	2 14
Down, . . . . .	3	14 5	1 11	15 16	11 9	1 13	13 2	2 14
Kilkenny, . . . . .	7	7 8	3 2	10 10	5 14	2 5	7 19	2 11
Mayo, . . . . .	1	12 0	2 17	14 17	11 5	0 18	12 3	2 14
Tipperary (S.R.) . . . . .	3	10 12	1 3	11 15	7 14	1 3	8 17	2 18
Tyrone, . . . . .	3	10 13	1 13	12 6	9 6	1 2	10 8	1 18
Wexford, . . . . .	2	10 8	1 8	11 16	8 8	1 8	9 16	2 0

SUMMARY of Results of Experiments on the Sprouting of Late  
Potatoes for thirteen years, 1903-15.

Year.	No. of Experiments.	Average Yield per Statute Acre.		Average gain in Yield due to Sprouting.
		Sprouted Seed.	Unsprouted Seed.	
		T. C.	T. C.	T. C.
1903, . . . . .	12	11 1	9 8	1 13
1904, . . . . .	34	11 6	8 13	2 13
1905, . . . . .	91	12 17	10 16	2 1
1906, . . . . .	67	11 9	9 2	2 7
1907, . . . . .	67	10 6	8 6	2 0
1908, . . . . .	67	13 0	10 15	2 5
1909, . . . . .	50	12 19	10 4	2 15
1910, . . . . .	288	12 5	10 1	2 4
1911, . . . . .	322	12 13	10 18	1 15
1912, . . . . .	354	12 4	10 9	1 15
1913, . . . . .	47	11 12	9 11	2 1
1914, . . . . .	38	11 13	9 13	2 0
1915, . . . . .	28	12 5	9 17	2 8
Average of 1,465 tests, . . . . .		12 5	10 6	1 19

This experiment has now been brought to a close. The average results of 1,465 tests show a gain in yield due to sprouting the seed of almost 2 tons per statute acre. This increase is more than sufficient to repay the cost of the sprouting boxes in one year. Surely no further testimony is required as to the merits of the system, full particulars of which are given in the Department's leaflet No. 58.

## VIII.—CULTIVATION TEST.

This experiment was designed to illustrate the advantages of adopting up-to-date methods in the cultivation of potatoes. The old method of growing potatoes consisted of taking seed directly from the pit for planting in the spring and of applying only farm-yard manure to the crop. Experiments have been carried out on an extensive scale to show the benefits resulting from the individual operations of (a) sprouting seed potatoes in boxes before planting; (b) the use of a suitable mixture of artificial manures; and (c) the spraying of the crop. In this test these three operations have been combined and tested against the older and less intensive method.

In 1915 the experiment was carried out at 20 centres in 12 counties. The results are given in Table III. on pages 262-3, but they have been summarised and the figures, together with those of the previous year, are shown in the following Table :—

## CULTIVATION TEST.—SUMMARY OF RESULTS.

PLOT 1.				PLOT 2.			
Seed planted whole directly from pit—20 tons dung only applied; crop left unsprayed.				Seed sprouted; 20 tons dung and 6 cwt. Standard mixture of artificials for Potatoes applied; cropsprayed twice.			
1915. AVERAGE YIELD PER STATUTE ACRE (20 CENTRES).							
Saleable	Small	Diseased	Total	Saleable	Small	Diseased	Total
T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
6 19	1 8	0 10	8 17	11 13	1 7	0 6	13 6
Increase due to improved methods				4 14	dec. 1	decrease 4	4 9
1914. AVERAGE YIELD PER STATUTE ACRE (31 CENTRES).							
T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
6 14	1 7	0 9	8 10	10 16	1 9	0 5	12 10
Increase due to improved methods				4 2	0 2	decrease 4	4 0

The tests were carried out with the leading maincrop varieties under conditions as uniform as possible, and at each centre seed

from the same source was selected, but for one plot it was sprouted in boxes during the winter and for the other plot it was allowed to remain in the pit until spring. It will be seen from the table that in 1915 the total increase in yield from plot 2 over plot 1 was 4 tons 9 cwt. per statute acre. The increase in the yield of saleable potatoes was 4 tons 14 cwt. per acre and there was a reduction in the proportion of small and diseased tubers. These results are even more striking than those obtained in the previous year.

Under ordinary conditions a liberal estimate of the cost of the combined operations of sprouting the seed, purchasing and applying artificial manures and spraying twice would be £4. For this expenditure an increased yield of 4 tons or upwards may be anticipated. It would be difficult to secure more striking evidence of the value of the best methods in the cultivation of the potato crop than is afforded by the results of this experiment.

#### IX.—CHANGE OF SEED EXPERIMENT.

The opinion is widely held that it is necessary to introduce a change of seed potatoes more or less frequently if the best results are to be obtained. Numerous tests made in Great Britain, under the auspices of the Department, have shown that an increased yield may be expected from the planting of Irish or Scottish grown seed potatoes as compared with seed grown locally.

In 1913 the Department decided that this was a matter on which useful information might be collected if experiments were conducted on a uniform basis in every county in Ireland, and such tests were instituted in 1914 and repeated on exactly the same lines in 1915.

The experiment is designed to ascertain :—

- (a) Whether any advantage is to be gained in Ireland by introducing a change of seed potatoes, and
- (b) If so, whether the seed potatoes should be procured from Great Britain or from another part of Ireland.

In order to eliminate all factors which might affect the yield other than that with which the experiment is directly concerned, seed was obtained early in 1913 from a common source in Ulster and sent to 6 centres to be grown there for a number of years ; each season part of the produce being returned and distributed to Agricultural Instructors for the purposes of the experiment.

The centres at which the seed is being grown are as follows :—

1. Ulster—Cookstown, Co. Tyrone.
2. Munster—Clonakilty, Co. Cork.
3. Leinster—Glasnevin, Co. Dublin.
4. Connaught—Athenry, Co. Galway.
5. England—St. Ives, Huntingdonshire.
6. Scotland—Dumfries, Dumfriesshire.

During each of the past two years seed was obtained from all the 6 centres, and after being graded as uniformly as possible was distributed to the Agricultural Instructors by whom the tests were carried out. The seed for the 1915 experiments had been grown two years at each centre, for, as already explained, the original stock was sent out by the Department in 1913. The variety is Up-to-Date. As a basis for comparison a plot was included on which was planted the farmers' own seed of Up-to-Date.

The detailed results from each centre are published in Table IV. on pages 264-5, but for easy comparison they have been summarised in the briefest form in the following Table :—

#### CHANGE OF SEED EXPERIMENT.—SUMMARY OF RESULTS.

Province.	Average Total Yield per Statute Acre.													
	Farmers Home-grown Seed		Seed Grown in Ulster		Seed Grown in Munster		Seed Grown in Leinster		Seed Grown in Connaught		Seed Grown in England		Seed Grown in Scotland	
	T.	C.	T.	C.	T.	C.	T.	C.	T.	C.	T.	C.	T.	C.
Ulster (9 Centres).	13	19	13	7	12	0	13	7	13	5	11	9	13	5
Munster, (12 Centres).	14	7	15	5	13	10	15	2	14	7	13	0	15	16
Leinster, (10 Centres).	12	11	12	18	11	15	11	18	11	19	9	15	13	0
Connaught, (7 Centres).	14	14	15	4	13	11	13	13	13	15	13	5	13	19
Ireland, 1915 (38 Centres).	13	17	14	3	12	14	13	11	13	7	11	17	14	2
Ireland, 1914 (37 Centres).	13	14	13	16	13	4	14	0	13	13	13	12	14	3

It is probable that as regards (1) the need for a change of seed potatoes and (2) the merits of one district over another in producing good seed climate is the chief determining factor. Bearing this in mind and having regard to the varying climatic conditions which prevail in different parts of Ireland, it is not advisable to confine the analysis of the results to the general average return of all the centres. Therefore, the average results obtained in each province should be studied, and it may be of assistance in interpreting the results if the order of merit of the different plots as regards average total yield be shown in the following manner :—

In Ulster.—1st, Homegrown seed ; 2nd and 3rd (equal), Ulster and Leinster ; 4th and 5th (equal), Connaught and Scotland ; 6th, Munster ; 7th, England.

In Munster.—1st, Scotland ; 2nd, Ulster ; 3rd, Leinster ; 4th and 5th (equal), Homegrown seed and Connaught ; 6th, Munster ; 7th, England. . . . .

In Leinster.—1st, Scotland ; 2nd, Ulster ; 3rd, Homegrown seed ; 4th, Connaught ; 5th, Leinster ; 6th, Munster ; 7th, England.

In Connaught.—1st, Ulster ; 2nd, Homegrown seed ; 3rd, Scotland ; 4th, Connaught ; 5th, Leinster ; 6th, Munster ; 7th, England.

It is hoped to repeat the experiment in 1916, but as regards the results so far obtained it may be noted that (1) the superiority of seed from Ulster and Scotland and (2) the unsuitability of England as a source of seed supply and to a less degree of Munster is more marked than in the previous year.



## MANURIAL TESTS

TABLE I.—Showing the Returns per

Centre.	Percentage of Organic Matter (Department's Analysis.)	Plot 1.			Plot 2.		
		15 tons Farm-yard Manure.			15 tons Farm-yard Manure, 1 cwt. Sulphate of Ammonia, 4 cwt. Superphosphate, 1 cwt. Muriate of Potash.		
		Saleable.	Small	Total	Saleable.	Small	Total
Drumdollagh, Stranocum, Co. Antrim, . . .	50.79	T. C. 11 12 25	C. 12 17 13	T. C. 0	T. C. 8	C. 13	T. C. 8
Donogroe, Killimer, Co. Clare, . . .	30.17	7 3 24	8 7 9	16 25	11 1		
Coolenarne, Millstreet, Co. Cork, . . .	26.13	13 0 19	13 19 16	3 17	17 0		
Claggan, Carrigart, Co. Donegal, . . .	28.63	10 13 20	11 13 15	11 20	16 11		
Corlane, Kesh, Co. Fermanagh, . . .	25.00	7 7 20	8 7 9	12 17	10 9		
Cloonagsha, Tuam, Co. Galway, . . .	24.22	4 13 35	6 8 6	2 51	8 13		
Rathbeg, Rathmore, Co. Kerry, . . .	17.46	10 11 30	12 11 6	29 12	15		
Landenstown, Sallins, Co. Kildare, . . .	13.30	9 0 39	10 19 10	3 45	12 8		
Rathconnell, Nurney, do., . . .	14.67	5 0 14	5 14 7	17 26	9 3		
Millpark, Drumsna, Co. Leitrim, . . .	26.73	9 17 33	11 10 11	15 30	13 5		
Altinure Park, Co. Londonderry, . . .	14.45	12 3 16	12 19 14	8 15	15 3		
Corthoon, Kiltimagh, Co. Mayo, . . .	21.29	10 0 45	12 5 11	10 80	15 10		
Weekfield, Roscommon, Co. Roscommon, . . .	34.65	7 0 37	8 17 9	13 34	11 7		
Savranne, Cloonloo, Co. Sligo, . . .	21.94	8 10 43	10 13 9	1 42	11 3		
Ballyneanor, Donemana, Co. Tyrone, . . .	18.20	7 18 30	9 8 9	10 30	11 0		
Drummin, Castlepollard, Co. Westmeath, . . .	22.00	3 17 9	4 6 5	19 6	6 5		
Average yield per statute acre, . . .		8 13 27	10 0 10	14 30	12 4		
Cost of Manures, . . .		£ s. d. 3 0 0		£ s. d. 5 0 6			
Value of Crop, less cost of Manures: Saleable Potatoes, 2s. per cwt.; Small 1s. per cwt. . . . .		15 13 0		17 17 6			

## ON PEATY SOILS.

Statute Acre from each Centre.

PLOT 3.			PLOT 4.			PLOT 5.			PLOT 6.			PLOT 7.			PLOT 8.		
15 tons Farm-yard Manure, 1 cwt. Sulphate of Ammonia, 4 cwt. Superphosphate, 1 cwt. Muriate of Potash.			15 tons Farm-yard Manure, 4 cwt. Superphosphate, 1 cwt. Muriate of Potash.			1½ cwt. Sulphate of Ammonia, 6 cwt. Basic Slag, 1½ cwt. Muriate of Potash.			1½ cwt. Nitrate of Soda, 6 cwt. of Basic Slag, 1½ cwt. Muriate of Potash.			1½ cwt. Nitrate of Soda, 6 cwt. Superphosphate, 1½ cwt. Muriate of Potash.			1½ cwt. Sulphate of Ammonia, 6 cwt. Superphosphate, 1½ cwt. Muriate of Potash.		
Sale-able.	Small	Total	Sale-able.	Small	Total	Sale-able.	Small	Total	Sale-able.	Small	Total	Sale-able.	Small	Total	Sale-able.	Small	Total
T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
11 12	20	12 12	6	17	13 3	11 3	14	11 17	9 12	17	10 9	9 18	20	10 18	11 6	17	12 3
8 10	20	9 10	7 3	19	8 2	7 7	21	8 8	7 8	30	8 18	8 10	32	10	9 0	33	10 13
15 8	12	16 0	14 4	22	15 6	14 4	13	14 17	12 3	13	12 16	14 8	17	15 5	13 8	14	14 2
13 16	21	14 17	13 9	20	14 9	13 17	23	15 0	14 10	19	15 9	13 14	16	14 10	15 4	13	15 17
10 0	15	10 15	9 15	15	10 10	7 10	15	8 5	7 0	17	7 17	7 10	15	8 5	7 16	15	8 11
6 2	36	7 18	5 17	26	7 3	5 15	42	7 17	6 4	40	8 4	5 19	38	7 17	4 9	35	6 4
10 15	34	12 9	10 15	36	12 11	8 0	40	10 0	7 11	41	9 12	7 14	39	9 13	9 14	30	11 4
11 5	43	13 8	11 10	40	13 10	8 6	35	10 1	7 10	38	9 8	7 15	43	9 18	8 6	41	10 7
7 19	21	9 0	6 15	27	8 2	8 10	11	9 1	8 11	15	9 6	9 18	20	10 18	8 4	23	9 7
11 12	27	12 19	11 5	28	12 13	12 8	27	13 15	11 17	27	13 4	11 10	25	12 15	11 15	24	12 19
15 17	11	16 8	15 7	9	15 16	11 10	9	11 19	10 4	9	10 13	13 17	5	14 2	13 16	7	13 3
7 10	95	12 5	8 5	90	12 15	10 0	85	14 5	9 5	75	13 0	8 0	80	12 0	7 10	65	10 15
9 9	35	11 4	10 6	29	11 15	7 8	45	9 13	8 17	34	10 11	6 2	29	7 11	9 1	25	10 6
8 17	44	11 1	8 10	40	10 10	7 10	43	9 13	6 18	64	10 2	7 2	69	10 11	7 14	45	9 19
9 17	22	10 19	9 17	31	11 8	9 11	14	10 5	7 18	27	9 5	9 11	21	10 12	9 14	26	11 0
5 14	6	6 0	4 17	6	5 3	5 19	3	6 2	4 3	2	4 5	4 9	2	4 11	7 14	2	7 16
10 5	29	11 14	10 0	28	11 8	9 6	28	10 14	8 14	29	10 3	9 2	29	10 11	9 12	26	10 18
£ s. d.			£ s. d.			£ s. d.			£ s. d.			£ s. d.			£ s. d.		
4 12 9			4 5 0			3 0 9			2 15 6			2 15 6			3 0 9		
17 6 3			17 3 0			16 19 3			16 1 6			16 17 6			17 9 3		

## MANURIAL TESTS

Table II.—Showing the Returns per

Centre.	Character of Soil.	Class of Seaweed.*	PLOT 1. 15 tons Farmyard Manure.		
			Sale-able.	Small	Total.
			T. C.	C.	T. C.
Drumnastanny, Falcarragh, Co. Donegal,	Loam, . . .	Drift Weed, . . .	9 11	21	10 12
Ballymore, Dunfanaghy, do.,	Do., . . .	Do., . . .	12 17	9	13 6
Do. do. do.,	Do., . . .	Wrack, . . .	12 17	9	13 6
Ballyferris, Ballywalter, Co. Down, .	Sandy. . .	Drift Weed, . . .	12 13	28	14 1
Cranfield, Kilkeel, do.,	Gravelly loam, .	Wrack, . . .	13 16	25	15 1
Jenkenstown, Dundalk, Co. Louth, .	Do. . . .	Do. . . .	9 11	38	11 9
Ross, Killala, Co. Mayo, . . .	Deep limestone, .	Wrack and Drift Weed.	9 7	38	11 5
Lecanvey, Westport, Do. . . .	Medium loam, .	Wrack, . . .	10 5	25	11 10
Average yield per statute acre, . . . . .			11 7 24	12 11	
Cost of Manures, . . . . .			£ 8.	d.	
			3 0 0		
Value of Crop less cost of Manures: Saleable Potatoes, 2s. per cwt.; Small, 1s. per cwt.			20 18 0		

\* Wrack consists chiefly of *Fucus* and allied genera, which grow between high and which are washed up from below low

## WITH SEAWEED.

Statute Acre from each Centre.

Plot 2. 15 tons Seaweed.			Plot 3. 15 tons Seaweed, 1 cwt. Sulphate of Ammonia, 4 cwt. Superphosphate, 1 cwt. Muriate of Potash.			Plot 4. 15 tons Seaweed, 4 cwt. Super- phosphate, 1 cwt. Muriate of Potash.			Plot 5. 15 tons Seaweed, 1 cwt. Sulphate of Ammonia, 4 cwt. Superphosphate.			Plot 6. 15 tons Seaweed, 4 cwt. Super- phosphate.		
Sale- able.	Small	Total.	Sale- able.	Small	Total.	Sale- able.	Small	Total.	Sale- able.	Small	Total.	Sale- able.	Small	Total.
T. C.	C.	T. C.	T. C.	C.	T. C.	T. C.	C.	T. C.	T. C.	C.	T. C.	T. C.	C.	T. C.
6 17	13	7 10	12 11	14	13 5	11 7	11	11 13	12 14	14	13 8	12 6	13	12 19
13 1	10	13 11	16 1	9	16 10	14 11	10	13 1	15 11	6	15 17	13 12	11	14 3
11 6	9	11 15	16 1	11	16 12	14 8	10	14 13	14 9	12	15 1	13 14	10	14 4
10 1	21	11 2	12 13	25	14 3	11 17	30	13 7	12 7	21	13 8	11 10	19	12 9
11 3	25	12 8	16 10	18	17 8	15 8	27	16 15	15 9	26	16 15	13 9	23	14 17
7 19	39	9 18	11 3	44	13 7	10 16	43	12 19	11 9	23	12 12	9 13	25	10 13
8 1	59	11 0	11 2	57	13 19	9 6	41	11 7	10 7	52	12 19	10 4	59	13 3
11 15	25	13 0	12 15	30	14 5	12 0	28	13 8	12 5	30	13 15	11 15	30	13 5
10 0	25	11 5	13 13	26	14 19	12 9	25	13 14	13 1	23	14 4	12 0	25	13 5
£ s. d.			£ s. d.			£ s. d.			£ s. d.			£ s. d.		
2 5 0			4 5 6			3 10 0			3 14 6			2 19 0		
19 0 0			24 6 6			22 13 0			23 10 6			22 6 0		

low water marks. Drift Weed consists chiefly of different varieties of *Laminaria*, water mark by tides and storms.

## CULTIVATION

TABLE III.—Showing the Returns per

Centre.	Variety of Potato.
Kilrush, Co. Clare, . . . . .	Irish Queen, . . . . .
Ballinspittle, Co. Cork . . . . .	Champion, . . . . .
Carrigart, Co. Donegal, . . . . .	British Queen, . . . . .
Beaufort, Co. Kerry, . . . . .	Champion, . . . . .
Kilgarvan, do., . . . . .	Do., . . . . .
Lisselton, do., . . . . .	Beauty of Bute, . . . . .
Naas, Co. Kildare, . . . . .	British Queen, . . . . .
Noone, do., . . . . .	Up-to-Date, . . . . .
Do. do., . . . . .	Scottish Triumph, . . . . .
Clara, Co. Kilkenny, . . . . .	Irish Queen, . . . . .
Cuffesgrange, do., . . . . .	Do., . . . . .
Freshford, do., . . . . .	Up-to-Date, . . . . .
Banagher, King's Co., . . . . .	Malncrop, . . . . .
Castlebar, Co. Mayo, . . . . .	Irish Queen, . . . . .
Mount Cashel, Co. Roscommon, . . . . .	Up-to-Date, . . . . .
Moorstown, Co. Tipperary (S.R.), . . . . .	Champion, . . . . .
Fethard, do., . . . . .	British Queen, . . . . .
Donemana, Co. Tyrone, . . . . .	Up-to-Date, . . . . .
Fintona, do., . . . . .	Do., . . . . .
Cappoquin, Co. Waterford, . . . . .	Irish Queen, . . . . .
<b>Average yield per statute acre (20 centres),</b> — — — —	
<b>Average Increase in yield due to improved methods,</b> — — — —	

\* Decrease of 9 cwt. In this case the potatoes on plot 2 grew too rank

## TEST.

Statute Acre from each Centre.

PLOT I. Seed planted whole directly from pit; 20 tons dung only applied; crop left unsprayed.				PLOT II. Seed sprouted; 20 tons dung and 8 cwt. standard mixture of artificials for Potatoes applied; crop sprayed twice.				Total Gain in Yield due to Cultiva- tion, &c.
Saleable.	Small.	Diseased.	Total.	Saleable.	Small.	Diseased.	Total.	
T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
9 4	1 4	0 12	11 0	14 0	1 6	0 8	15 14	4 14
3 11	1 5	0 5	5 1	7 16	1 12	0 7	9 15	4 14
10 9	0 11	1 6	12 6	19 6	0 8	0 6	20 0	7 14
10 11	1 8	—	11 19	10 0	1 10	—	11 10	0 9*
6 3	1 9	—	7 12	10 14	1 11	—	12 5	4 13
3 12	0 9	—	4 1	9 15	1 3	—	10 18	6 17
4 10	2 17	—	7 7	12 4	1 18	—	14 2	6 15
8 16	2 2	0 12	11 10	12 5	2 0	0 12	14 17	3 7
8 8	1 7	0 12	10 7	12 17	2 0	0 12	15 9	5 2
5 14	2 3	—	7 17	9 7	2 0	0 4	11 11	3 14
3 13	0 19	—	4 12	6 11	1 3	—	7 14	3 2
11 6	1 10	0 4	13 0	15 10	1 9	0 1	17 0	4 0
6 8	1 10	1 17	9 15	11 5	0 9	1 13	13 7	3 12
7 14	2 6	0 8	10 8	10 6	2 0	0 2	12 8	2 0
7 5	1 5	1 10	10 0	11 5	1 0	0 15	13 0	3 0
6 12	1 6	0 10	8 8	11 10	1 10	0 12	13 12	5 4
6 16	1 2	0 15	8 13	12 12	0 12	0 7	13 11	4 18
4 13	1 3	1 0	6 16	12 10	0 13	0 2	13 5	6 9
7 4	2 2	0 11	9 17	12 7	1 16	0 10	14 13	4 16
6 17	0 6	0 1	7 4	10 17	0 14	0 1	11 12	4 8
6 19	1 8	0 10	8 17	11 13	1 7	0 6	13 6	4 9
—	—	—	—	4 14	0 1	0 4	4 9	4 9
				Decrease		Decrease		

and the yield was reduced in consequence.

## CHANGE OF SEED

TABLE IV.—Showing the Returns per

Province and County.	Character of Soil	Farmers' Homegrown Seed.				Seed Grown in Ulster.				Seed Grown in Munster.			
		Sale-able.	Small.	Dis- eased.	Total.	Sale-able.	Small.	Dis- eased.	Total.	Sale-able.	Small.	Dis- eased.	Total.
Antrim, . . . .	Medium Loam, . .	T. C. 15 19	T. C. 0 16	T. C. —	T. C. 16 15	T. C. 12 16	T. C. 0 13	T. C. —	T. C. 13 9	T. C. 10 14	T. C. 0 13	T. C. —	T. C. 11 7
Armagh, . . . .	Heavy Loam, . . .	9 13	0 13	0 8	10 19	10 17	1 10	0 8	12 15	7 14	1 10	0 6	9 10
Cavan, . . . . .	Medium Loam, . .	14 0	2 17	—	16 17	14 5	2 1	—	16 6	11 16	2 13	—	14 9
Donegal, . . . .	Gravelly Loam, . .	17 6	0 8	0 4	17 18	15 8	1 0	0 3	16 11	12 13	0 14	0 7	13 14
Down, . . . . .	Light Moor, . . .	15 8	1 10	0 3	17 15	16 1	5 0	0 1	17 2	14 17	1 5	0 1	16 3
Fermanagh, . . .	Medium Loam, . .	10 16	1 14	—	12 10	10 2	1 1	—	11 3	10 5	2 4	—	12 9
Monaghan, . . .	Strong Clay Loam, .	9 2	1 13	0 13	11 18	9 6	1 13	0 16	11 17	8 15	1 11	1 3	11 9
Monaghan, . . .	Light Sharp Clay, .	7 6	1 12	—	8 18	6 12	1 10	—	8 2	6 12	1 10	—	8 2
Tyrone, . . . . .	Clay Loam, . . .	11 6	1 5	0 4	12 15	10 19	1 7	0 6	12 12	9 3	1 8	0 5	10 16
Average for Ulster, .	(9 Centres), . . .	12 6	1 9	0 4	13 19	11 16	1 7	0 4	13 7	10 5	1 10	0 5	12 0
Clare, . . . . .	Loam, . . . . .	14 6	1 13	—	16 4	14 9	1 8	—	15 17	11 6	1 17	—	13 3
Clare, . . . . .	Loam, . . . . .	23 6	1 10	0 11	25 7	19 2	0 19	0 9	20 10	17 13	0 18	0 8	19 1
Cork, . . . . .	Medium Loam, . .	10 17	1 3	—	12 0	9 17	1 3	0 5	11 3	7 11	1 10	0 6	9 7
Cork, . . . . .	Friable Clay Loam, .	13 10	2 8	—	15 18	13 18	2 0	—	15 18	13 6	1 8	—	14 14
Cork, . . . . .	Clay Loam, . . .	13 6	1 2	0 13	15 6	12 10	1 8	1 2	15 0	10 6	1 4	0 19	12 9
Cork, . . . . .	Peaty Loam, . . .	7 11	0 8	0 1	8 0	15 14	1 2	0 5	17 1	12 8	1 1	0 4	13 13
Kerry, . . . . .	Rich Loam, . . .	9 6	0 14	—	10 0	13 0	0 15	—	13 13	11 11	0 12	—	12 3
Limerick, . . . .	Limestone Loam, .	11 11	2 2	—	13 13	14 16	2 2	—	16 18	15 8	2 14	—	18 2
Limerick, . . . .	Clay Loam, . . .	17 4	2 0	—	19 4	15 6	2 0	—	17 6	14 0	1 15	—	15 15
Tipperary (N.R.),	Light Clay, . . .	6 12	1 8	0 13	8 13	8 5	2 9	0 13	11 7	6 12	2 2	0 11	9 6
Tipperary (S.R.),	Peaty Loam, . . .	12 17	1 0	0 15	14 12	10 18	0 12	0 15	12 5	10 12	0 17	0 15	12 4
Waterford, . . .	Medium Loam, . .	12 8	0 15	0 5	13 8	14 18	0 13	0 15	12 12	1 0	1 11	—	12 12
Average for Munster, .	(12 Centres), . . .	12 15	1 7	0 5	14 7	13 11	1 8	0 6	15 5	11 18	1 7	0 5	13 10
Carlow, . . . . .	Rich Loam, . . .	13 6	0 8	—	13 14	14 3	1 3	—	15 6	13 2	1 2	—	14 5
Kilkenny, . . . .	Medium Loam, . .	7 13	1 11	0 2	9 6	7 7	1 11	0 2	9 0	6 6	1 1	0 2	7 9
King's, . . . . .	Rich Sandy Loam, .	14 7	1 13	—	16 0	10 11	1 7	—	11 18	10 10	1 1	—	11 11
Longford, . . . .	Light Loam, . . .	12 7	1 11	0 9	14 7	14 15	1 10	0 7	16 12	14 14	1 6	0 8	16 8
Louth, . . . . .	Clay Loam, . . .	13 13	0 16	—	14 9	16 3	1 13	—	17 16	14 4	1 11	—	15 13
Meath, . . . . .	Light Loam, . . .	10 6	0 10	—	10 16	10 11	0 13	—	11 6	12 10	0 15	—	13 5
Queen's, . . . . .	Medium Loam, . .	6 5	0 17	0 2	7 4	6 9	0 17	0 1	7 7	6 11	1 1	0 1	7 13
Westmeath, . . .	Medium Loam, . .	13 8	1 17	0 2	15 7	11 18	1 7	0 13	6 7	6 2	2 2	0 1	9 9
Wexford, . . . .	Clay Loam, . . .	9 2	0 15	—	9 17	10 13	0 13	—	11 8	7 13	0 11	—	8 4
Wicklow, . . . .	Light Loam, . . .	11 12	2 10	0 6	14 8	13 13	1 0	0 5	14 18	11 12	1 10	0 5	13 7
Average for Leinster, .	(10 Centres), . . .	11 4	1 5	0 2	12 11	11 12	1 4	0 2	12 13	10 9	1 4	0 2	11 15
Galway, . . . . .	Limestone Loam, .	14 12	2 0	—	16 12	15 10	1 5	—	16 15	14 0	1 2	—	15 2
Leitrim, . . . . .	Peat, . . . . .	12 17	0 13	0 8	13 18	13 10	0 17	0 13	15 6	12 6	0 13	0 8	13 7
Mayo, . . . . .	Medium Clay, . . .	14 12	1 11	—	16 3	14 12	1 7	—	15 19	12 16	1 13	—	14 11
Mayo, . . . . .	Light Loam, . . .	12 4	2 0	—	14 4	12 6	1 8	—	14 4	11 18	2 2	—	14 0
Roscommon, . . .	Light Limestone, .	14 18	0 16	0 6	16 0	15 6	1 2	0 8	16 13	4 1	1 6	0 10	15 0
Roscommon, . . .	Heavy Clay, . . .	9 2	1 6	0 13	11 11	5 1	1 0	0 12	12 17	8 11	1 0	0 19	10 10
Sligo, . . . . .	Strong Loam, . . .	13 15	1 3	—	14 18	13 16	0 17	—	14 13	11 0	0 17	—	12 6
Average for Connaught, .	(7 Centres), . . .	13 3	1 7	0 4	14 14	13 15	1 4	0 5	15 4	12 1	1 5	0 5	13 11
Average for Ireland, . .	(38 Centres), . . .	12 6	1 7	0 4	13 17	12 13	1 6	0 4	14 3	11 3	1 7	0 4	12 14

## EXPERIMENT.

Statute Acre from each Centre.

Seed Grown in Leinster.				Seed Grown in Connaught.				Seed Grown in England.				Seed Grown in Scotland.			
Sale- able.	Small.	Dis- eased.	Total.	Sale- able.	Small.	Dis- eased.	Total.	Sale- able.	Small.	Dis- eased.	Total.	Sale- able.	Small.	Dis- eased.	Total.
T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
11 10	0 18	—	12 8	14 8	1 1	—	15 9	12 16	1 1	—	13 17	8 8	1 11	—	9 9
8 18	1 14	0 6	10 18	8 16	1 10	0 6	10 12	8 7	0 19	0 5	9 11	10 13	1 11	0 4	12 12
14 5	0 12	—	17 17	14 7	2 15	—	17 2	11 2	2 9	—	13 11	12 3	3 0	—	15 15
12 16	0 13	0 5	13 14	12 14	0 17	0 4	13 15	11 7	1 0	0 7	12 14	16 7	0 17	0 4	17 17
16 14	1 5	0 1	18 0	15 4	1 6	0 2	16 12	13 7	1 2	0 1	14 10	15 13	1 5	0 2	17 17
11 11	2 6	—	13 17	10 5	2 6	—	12 11	10 4	2 4	—	12 8	11 6	2 10	—	13 13
8 8	2 2	1 1	11 11	9 0	1 16	0 19	11 15	7 16	2 4	0 18	10 18	8 18	2 0	1 3	12 12
7 4	1 14	—	8 18	5 10	2 16	—	8 6	4 8	1 14	—	6 2	6 4	2 0	—	8 8
11 6	1 10	0 4	13 0	11 6	1 8	0 3	12 17	7 18	1 6	0 6	9 10	11 5	1 14	0 6	13 13
11 8	1 15	0 4	13 7	11 6	1 15	0 4	13 5	9 14	1 11	0 4	11 9	11 5	1 16	0 4	13 13
14 6	1 11	—	15 17	15 6	1 15	—	17 1	12 1	1 9	—	13 10	12 4	2 10	—	14 14
20 3	1 1	0 10	21 14	19 18	1 1	0 11	21 0	16 10	1 2	0 12	18 4	22 0	1 0	0 11	23 23
9 1	1 0	0 5	10 6	8 18	1 1	0 6	10 5	8 9	0 17	0 4	9 10	11 0	1 2	0 3	12 12
13 4	1 18	—	15 2	12 11	1 6	—	13 16	12 8	1 12	—	14 0	15 6	1 12	—	16 16
13 18	1 6	1 0	16 4	11 7	1 14	1 1	13 16	10 6	1 5	0 15	12 6	13 17	1 6	1 0	16 16
13 10	0 17	0 3	14 10	13 7	0 18	0 3	14 1	15 14	0 15	0 3	16 12	16 19	1 0	0 5	18 18
12 8	0 12	—	13 0	12 3	0 13	—	12 13	8 12	0 18	—	9 10	12 13	0 14	—	13 13
14 10	2 2	—	16 12	16 10	1 18	—	18 8	13 1	1 16	—	14 17	15 9	1 13	—	17 17
15 4	2 18	—	18 2	14 12	1 15	—	16 7	12 6	1 15	—	14 1	14 13	3 0	—	17 17
9 18	2 16	0 16	13 10	7 9	2 13	0 11	10 13	7 12	1 8	1 8	10 8	8 5	2 6	0 9	11 11
9 19	0 14	0 16	11 9	9 12	1 1	0 10	11 3	9 12	0 16	0 8	10 16	10 16	1 8	0 6	12 12
13 17	0 14	0 1	14 12	12 13	0 12	0 2	13 7	11 14	0 12	0 3	12 9	14 11	0 14	0 1	15 15
13 7	1 9	0 6	15 2	12 15	1 7	0 5	14 7	11 10	1 4	0 6	13 0	14 0	1 11	0 5	15 15
12 0	1 1	—	13 1	12 14	1 6	—	14 0	9 3	1 6	—	10 9	12 11	1 17	—	14 14
5 4	1 16	—	7 3	6 11	1 14	0 3	8 8	5 16	1 12	0 3	7 11	7 0	2 4	0 1	9 9
10 17	1 6	0 2	12 5	12 3	0 18	—	13 1	8 3	1 13	0 2	9 18	13 8	2 0	0 1	15 15
13 15	1 11	0 9	15 15	14 0	1 9	0 9	15 18	12 7	1 8	0 8	14 3	15 0	1 7	0 7	16 16
14 10	1 2	—	15 12	12 12	1 7	—	13 19	8 14	0 16	—	9 10	13 18	1 7	—	15 15
12 19	0 10	—	13 9	11 11	0 14	—	12 5	9 0	1 2	—	10 2	12 16	0 12	—	13 13
6 15	0 19	0 1	7 15	6 12	0 17	0 1	7 10	6 2	0 17	0 1	7 0	6 16	1 0	0 1	7 7
9 0	1 4	0 2	10 6	9 8	1 4	0 1	10 13	7 14	1 9	0 3	9 6	9 2	2 4	0 7	11 11
8 6	0 15	—	9 1	8 14	1 0	—	9 14	7 19	0 10	—	8 9	9 12	0 18	—	10 10
13 2	1 10	0 4	14 16	12 2	1 10	0 5	13 17	9 2	1 15	0 5	11 2	14 3	1 5	0 4	15 15
10 13	1 3	0 2	11 18	10 13	1 4	0 2	11 19	8 8	1 5	0 2	9 15	11 9	1 9	0 2	13 13
13 7	1 6	—	14 13	14 11	1 4	—	15 15	14 0	1 1	—	15 1	13 15	1 2	—	14 14
11 15	0 14	0 8	12 17	12 13	0 13	0 7	13 13	11 9	0 13	0 8	12 10	11 11	0 14	0 9	12 12
14 0	2 3	—	16 3	13 6	1 11	—	14 17	12 12	1 7	—	13 19	14 0	2 15	—	16 16
11 17	2 0	—	13 17	12 3	1 18	—	14 1	11 11	2 0	—	13 11	12 6	2 0	—	14 14
14 8	1 1	—	16 3	13 16	0 18	0 16	15 10	10 10	1 6	0 13	12 9	13 2	1 5	0 15	15 15
7 10	1 1	0 16	9 7	7 16	1 6	0 13	9 15	10 7	0 13	0 12	11 12	8 13	0 8	0 8	9 9
11 7	1 5	—	12 12	12 0	0 15	—	12 15	12 10	0 18	—	13 8	13 1	1 6	—	14 14
12 1	1 7	0 5	13 13	12 6	1 4	0 5	13 15	11 17	1 3	0 5	13 5	12 7	1 7	0 5	13 13
11 18	1 9	0 4	13 11	11 15	1 8	0 4	13 7	10 7	1 6	0 4	11 17	12 7	1 11	0 4	14 14



## IV—MANGELS.

## I.—MANURIAL TEST (OLD SERIES).

During the eleven years 1901-11 the Department carried out a series of experiments to discover a simple and profitable method of manuring the mangel crop. The tests were made at 188 centres distributed over the whole country, on a great diversity of soils and with the principal varieties of mangels.

It is necessary to state that when the experiment had been in progress for five years it was deemed desirable to modify slightly the original scheme by increasing the amounts of some of the manures employed. The experiment was, therefore, divided into two periods and the returns for each period were shown separately.

The general average results of 127 tests made during the second period of six years 1906-11 are given in the following Table :—

Year.	No. of Experiments.	PLOT 1. No Manure.	PLOT 2 20 tons Farm-yard Manure.	PLOT 3. 20 tons Farm-yard Manure, 4 cwt. Superphosphate.	PLOT 4. 20 tons Farm-yard Manure, 4 cwt. Superphosphate, 2 cwt. Sulphate of Ammonia.	PLOT 5. 20 tons Farm-yard Manure, 4 cwt. Superphosphate, 2 cwt. Sulphate of Ammonia, 4 cwt. Kainit.	PLOT 6. 20 tons Farm-yard Manure, 4 cwt. Superphosphate, 2 cwt. Sulphate of Ammonia, 4 cwt. Salt.	PLOT 7. 20 tons Farmyard Manure, 4 cwt. Superphosphate, 4 cwt. Salt, Nitrate of Soda (applied after thinning in two dressings).
Average yield per statute acre								
		T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
1906	26	9 7	24 19	27 12	29 6	32 1	34 7	34 14
1907	35	10 18	25 15	26 17	29 15	32 15	34 5	32 19
1908	24	8 11	26 7	27 5	31 2	33 10	34 13	34 8
1909	14	7 16	24 4	25 11	27 19	30 5	30 16	30 15
1910	19	9 11	23 11	26 8	29 19	32 9	33 12	31 16
1911	9	8 14	24 2	26 6	30 12	34 4	35 10	36 3
Average Yield		9 9	25 2	26 15	29 16	32 12	33 19	33 8
Average Cost of Manures		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Value of Crop less cost of Manures (Mangels at 10s. per ton)		4 14 6	8 11 0	8 15 2	8 16 4	9 12 10	10 11 10	10 11 4

The main conclusion to be drawn from this experiment is that a thoroughly reliable manurial dressing for the mangel crop consists of a liberal application of farmyard manure in conjunction with

4 cwt. Superphosphate  
 2 cwt. Sulphate of Ammonia  
 4 cwt. Salt.

} per Statute Acre.

In case the crop is backward in growth or attacked by insect pests, a top dressing of 1 cwt. nitrate of soda after the mangels are thinned is recommended.

## II.—MANURIAL TEST (NEW SERIES).

With a view to ascertaining whether the quantity of any of the three ingredients in the mixture specified above could, with advantage, be increased or reduced, a new series of experiments was commenced in 1908. Each plot received a fixed dressing of 20 tons farmyard manure, together with a mixture of artificial manures, in which the three ingredients were applied in varying proportions.

The experiment has now been brought to a close after having been repeated for eight consecutive years. During the past season tests were made on 35 farms in 17 counties.

For easy reference and comparison the average results for 1915 and also for the whole period of eight years 1908-15 are summarised briefly in the following Tables.

In each Table plot No. 3, manured with the standard mixture of artificials, viz., 4 cwt. superphosphate, 2 cwt. sulphate of ammonia, and 4 cwt. salt forms the basis of comparison for the remainder of the plots.

## Varying quantities of Superphosphate.

Plot	Manures applied per Statute Acre.	1915. (35 Centres.)			Average for eight years, 1908-15. (326 Centres.)		
		Average yield per Statute Acre.	Average value of Crop less cost of Manures.		Average yield per Statute Acre.	Average value of Crop less cost of Manures.	
		t.	c.	£ s. d.	t.	c.	£ s. d.
2	3 cwt. Superphosphate with Dung, Sulphate of Ammonia and Salt, .	36	7	11 16 0	33	8	10 7 10
3	4 cwt. Superphosphate, do., .	37	3	12 0 6	34	14	10 17 9
4	5 cwt. Superphosphate, do., .	37	8	11 19 6	34	18	10 16 5

## Varying quantities of Sulphate of Ammonia.

Plot.	Manures applied per Statute Acre.	1915. (35 Centres.)			Average for eight years, 1908-15 (226 Centres.)						
		Average yield per Statute Acre.	Average value of Crop less cost of Manures.			Average yield per Statute Acre.	Average value of Crop less cost of Manures.				
		T.	C.	£	s.	d.	T.	C.	£	s.	d.
5	1 cwt. Sulphate of Ammonia, with Dung, Super- phosphate and Salt, . . . .	35	14	12	1	6	33	10	11	0	9
3	2 cwt. Sulphate of Ammonia, do.,	37	3	12	0	6	34	14	10	17	9
6	3 cwt. Sulphate of Ammonia, do.,	39	6	12	6	6	36	7	10	19	1

## Varying quantities of Salt.

Plot.	Manures applied per Statute Acre.	1915. (35 Centres.)				Average for eight years, 1908-15. (226 Centres.)			
		Average yield per Statute Acre		Average value of Crop less cost of Manures.		Average yield per Statute Acre.		Average value of Crop less cost of Manures.	
		T.	C.	£	s. d.	T.	C.	£	s. d.
7	2 cwt. Salt, with Dung, Super-phosphate and Sulphate of Ammonia, ..	36	1	11	12 6	33	3	10	4 11
3	4 cwt. Salt, do., .	37	3	12	0 6	34	14	10	17 9
8	6 cwt. Salt, do., .	38	14	12	13 0	35	6	11	0 9

Since 1912 an extra plot, No. 9, has been included in the experiments with the object of showing the effects of the application of three-quarters of the amount of the standard dressing of artificials applied on plot 3.

The following Table shows the returns obtained from dung alone, dung and three-quarters of the standard dressing of artificials, and dung with the full quantity of the standard dressing, respectively:—

## Varying quantities of the Standard Mixture.

Plot.	Manures applied per Statute Acre.	1915. (35 Centres.)				Average for four years 1912-15. (113 Centres.)			
		Average yield per Statute Acre.		Average value of Crop less cost of Manures.		Average yield per Statute Acre.		Average value of Crop less cost of Manures.	
		T.	C.	£	s. d.	T.	C.	£	s. d.
1	20 tons Dung, .	26	10	9	5 0	24	18	8	8 9
9	20 tons Dung, 7½ cwt. Standard Mixture of Artificials (¾ dressing) . . .	34	15	11	9 3	32	9	10	5 9
3	20 tons Dung, 10 cwt. Standard Mixture of Artificials (Full dressing) .	37	3	12	0 6	34	19	10	18 7

In calculating the value of the crop the mangels have been taken at 10s. per ton. The manures have been charged at the same prices per ton as in the previous year, namely, sulphate of ammonia, £15 10s.; nitrate of soda, £12; superphosphate, £3 10s.; kainit, £3; salt £1 10s.; farmyard manure, 4s. Owing to the war, however, the cost of sulphate of ammonia and nitrate of soda was somewhat higher than the prices charged while kainit was much dearer and practically unobtainable.

The principal results may be epitomised briefly as follows :—

(1) Decidedly the best returns have been obtained from the application of 4 cwt. superphosphate. In no season has 3 cwt. been sufficient to meet the full requirements of the crop, whilst 5 cwt. has seldom proved profitable.

(2) There is very little difference after deducting the cost of the manures in the value of the crop from each of the three plots manured with sulphate of ammonia at the rate of 1 cwt., 2 cwt., and 3 cwt. respectively. Whilst the application of the heavy dressing of 3 cwt. has proved slightly more profitable than that of 2 cwt., it is doubtful whether so large an outlay is desirable. The use of from 1 to 2 cwt. is likely to give more satisfactory results under average conditions.

(3) Almost without exception better results have been obtained from the use of 4 cwt. salt than of 2 cwt. On the other hand the larger dressing of 6 cwt. has given a slightly higher average net return than 4 cwt., but the results have been very variable. They were most favourable to the heavy dressing of 6 cwt. in the dry seasons of 1911, 1913, 1914, and 1915.

(4) Each year a greater profit has been obtained from the application of the full quantity—10 cwt.—of the standard mixture of artificials than from the same mixture applied at the reduced rate of  $7\frac{1}{2}$  cwt. per statute acre.

These results do not indicate that any advantage is to be gained by modifying the standard mixture of artificials recommended on page 266, except that in certain cases, such as, for instance, where dung of very good quality is being used or where the crop is being grown on particularly good land, the quantity of sulphate of ammonia might be reduced to 1 cwt. per statute acre.

### III.—MANURIAL TESTS ON PEATY SOILS.

This experiment is being carried out on soils of a pronounced peaty character with the following objects :—

(a) To ascertain whether any advantage would be gained by reducing the quantity of sulphate of ammonia or of omitting it entirely from the mixture of artificial manures when applied in conjunction with dung.

(b) To compare the standard mixture of artificials along with dung against a similar mixture in which kainit is applied instead of salt.

(c) To compare the results obtained from different mixtures of artificials alone with farmyard manure and artificials applied together.

An experiment on similar lines was carried out in 1914, but in the past season an extra plot, No. 8, was included. In 1915 tests were made at 7 centres in 6 counties.

The detailed results obtained at each centre together with the average figures for 1914 are given in the following Table.

Centre.	Per-centage of Organic Matter. (Depart-ment's Analysis).	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 5.	Plot 6.	Plot 7.	Plot 8.
		20 tons Farmyard Manure.	20 tons Farmyard Manure. 4 cwt. Super- phosphate, 1 cwt. Sulphate of Ammonia, 4 cwt. Kainit.	20 tons Farmyard Manure. 4 cwt. Super- phosphate, 1 cwt. Sulphate of Ammonia, 4 cwt. Kainit.	20 tons Farmyard Manure. 4 cwt. Super- phosphate, 2 cwt. Sulphate of Ammonia, 4 cwt. Kainit.	20 tons Farmyard Manure. 4 cwt. Super- phosphate, 2 cwt. Sulphate of Ammonia, 4 cwt. Kainit.	4 cwt. Super- phosphate, 2 cwt. Nitrate of Soda, 4 cwt. Kainit.	4 cwt. Super- phosphate, 2 cwt. Nitrate of Soda, 4 cwt. Kainit.	4 cwt. Super- phosphate, 2 cwt. Sulphate of Ammonia, 4 cwt. Salt.
Aughadown, Co. Cork . . . . .	22.95	T. 38 14 C. 42 0	T. 42 0 C. 33 10	T. 46 4 C. 35 16	T. 45 0 C. 37 14	T. 44 13 C. 39 18	T. 27 0 C. 32 18	T. 13 1 C. 34 17	T. 18 3 C. 28 14
Lisnaskea, Co. Fermanagh . . . . .	36.09	24 11	33 10	35 16	37 14	39 18	32 18	34 17	28 14
Johnstown, Co. Kilkenny . . . . .	13.38	20 11	31 7	30 15	28 0	30 7	30 7	27 13	31 7
Drumlah, Co. Longford . . . . .	27.05	19 10	25 9	28 17	33 6	33 13	33 4	33 5	32 1
Mountmellick, Queen's Co. . . . .	24.11	16 6	23 13	26 6	28 11	27 3	21 15	21 8	15 10
Maryboro', Queen's Co. . . . .	22.28	17 16	23 9	23 10	25 14	28 16	25 2	17 15	17 13
Roscommon, Co. Roscommon . . . . .	25.47	30 7	28 4	32 3	28 4	34 0	26 16	25 18	27 0
Average yield per statute acre, . . . . .		23 19	29 13	31 19	32 7	34 1	28 3	24 17	24 7
Cost of Manures, . . . . .		£ s. d. 4 0 0	£ s. d. 5 6 0	£ s. d. 6 1 6	£ s. d. 6 17 0	£ s. d. 6 11 0	£ s. d. 2 10 0	£ s. d. 2 4 0	£ s. d. 2 11 0
Value of Crop, less cost of Manures (Mangels at 10s. per ton), . . . . .		7 19 6	9 10 6	9 18 0	9 6 6	10 9 6	11 11 6	10 4 6	9 12 6
Do. Do. for 1914 (6 Centres) . . . . .		9 0 0	11 2 6	11 18 6	11 17 6	11 18 6	14 9 6	14 15 0	—

The results so far obtained seem to indicate that—

(1) On peaty soils when applied along with dung the quantity of sulphate of ammonia in the mixture of artificials might often with advantage be reduced to 1 cwt.

(2) A greater profit may be expected from the use of the standard mixture than from a similar mixture in which the salt is replaced by an equal quantity of kainit.

(3) Very satisfactory crops can be produced from the use of artificials alone.

#### IV.—VARIETY TEST.

These experiments, carried out to compare the relative cropping powers of different varieties of mangels, were conducted at 41 centres in 18 counties.

The average results for 1915, together with those of the five previous years, 1910-14, are reproduced in the following Table:—

Variety of Mangel.	1915 (41 Centres)		1910-14 (154 Centres)	
	Average yield per		Statute Acre	
	T.	C.	T.	C.
Prize Winner . . . . .	37	4	32	10
Yellow Globe . . . . .	35	18	32	2
Long Red . . . . .	34	2	28	12
Golden Tankard . . . . .	27	2	25	12

In each of the six seasons under review, Prize Winner and Yellow Globe have given appreciably heavier crops than the Long Red and Golden Tankard varieties.

## V—OATS.

## I.—MANURIAL TEST (OLD SERIES).

The object of this series of experiments was to test the effect of the best known artificial manures when used singly and in combination on the oat crop. The tests which were commenced in 1901 and concluded in 1911, were made at 150 centres under widely differing conditions.

The general average results for the whole period are summarised in the briefest possible form in the following Table :—

	PLOT 1.		PLOT 2.		PLOT 3.		PLOT 4.		PLOT 5.	
	No Manure.		1 cwt. Sulphate of Ammonia.		3 cwt. Super-phosphate.		1 cwt. Sulphate of Ammonia, 3 cwt. Super-phosphate.		1 cwt. Sulphate of Ammonia, 3 cwt. Super-phosphate, 3 cwt. Kainit.	
Average of eleven years 1901-1911 (150 Centres.)	Average yield per Statute Acre.									
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	cwt. qr.	cwt.	cwt. qr.	cwt.	cwt. qr.	cwt.	cwt. qr.	cwt.	cwt. qr.	cwt.
	15 3	26	18 1	31	18 1	30	21 0	36	22 2	39
Average Cost of Manures,	£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	
	—		0 13 8		0 9 3		1 2 11		1 10 11	
Value of Crop* less Cost of Manures,	6 13 6		7 2 4		7 5 3		7 17 1		8 2 7	

\*Grain at 9d. per stone; Straw at 1s. 6d. per cwt.

## II.—MANURIAL TEST (NEW SERIES).

From the commencement of the Old Series of Oat Manurial experiments, distinctly the best and most uniform results were obtained from the application of the complete mixture of artificials composed of 1 cwt. sulphate of ammonia, 3 cwt. superphosphate, 3 cwt. kainit. Whilst 1 cwt. sulphate of ammonia may be regarded as a suitable dressing of nitrogenous manure, it was deemed advisable to obtain more definite information regarding the most profitable quantities of superphosphate and kainit, respectively, to use in conjunction with sulphate of ammonia. Accordingly, in 1908, a New Series of experiments was commenced to test the effects of applying different quantities of superphosphate and kainit.

The experiments were concluded in 1913 after being repeated during six consecutive seasons. The tests were carried out at 81 centres distributed throughout the whole country.

The results from the several mixtures tested were very similar but the main deductions were as follows :—

(1) That the most generally suitable quantity of superphosphate is 3 cwt. per statute acre.

(2) That in most cases an application of 2 cwt. kainit per statute acre is sufficient to meet the potash requirements of the oat crop.

(3) That under ordinary circumstances from 5 to 6 cwt. of a complete mixture of artificials is a sufficiently heavy dressing for oats.

*Conclusions.*—The results of both the Old and New Series of experiments indicate very clearly that whilst farmers cannot always rely on getting a profitable crop increase from the use of sulphate of ammonia, superphosphate or kainit, when applied alone, yet they may be confident of realising a profit when all three are used together in the following proportions :—

1 cwt. Sulphate of Ammonia,	} per Statute Acre.
3 cwt. Superphosphate,	
2 cwt. Kainit,	

It should be observed that this dressing is recommended chiefly for oats grown on poor lea land, or for oats following a corn crop. It might also be applied to oats sown after a root crop to which no farmyard manure was applied.

In addition to increased yield, the following advantages will be derived from the use of such a mixture of artificial manures :—Grain of decidedly superior quality is produced ; the plants braird better and suffer less injury from attacks of insect pests, such as wireworms and leather jacket grubs ; the corn ripens earlier, so that it is ready for cutting sooner than would otherwise be the case.

### III.—MANURIAL TEST ON PEATY SOILS.

As a considerable area of oats is grown on soils of a peaty nature, it was considered desirable to investigate the manurial requirements of the oat crop on this class of land. Accordingly, a simple experiment has been carried out during the past two seasons with the following objects :—

- (a) To test the value of superphosphate alone and in combination with kainit as compared with the standard mixture ;
- (b) To compare the results obtained from the standard mixture with those obtained from a mixture in which the sulphate of ammonia is replaced by nitrate of soda.

In 1915 tests were made at 9 centres in 7 counties. The detailed returns and the average figures for the past two seasons are given in the Table on page 277.



In calculating the value of the crop the manures have been charged at the same price per ton as in the previous year, viz. :—superphosphate, £3 10s. ; kainit, £3 ; sulphate of ammonia, £15 10s. ; nitrate of soda, £12. It is necessary to point out, however, that owing to the war sulphate of ammonia and nitrate of soda were slightly higher in price than the figures given, while kainit was very much dearer and practically unobtainable. On the other hand, the same prices have been put upon the grain and straw as in 1914.

Concerning the results so far obtained it may be noted that :—

- (1) In both years the application of superphosphate alone has produced a substantial and profitable increase in the yield.
- (2) The addition of kainit to the dressing of superphosphate has brought about a further increase in the yield sufficient to leave a moderate profit.
- (3) It is doubtful whether the addition of either sulphate of ammonia or nitrate of soda to a mixture of superphosphate and kainit can be relied upon generally to increase the crop sufficiently to return a profit.

#### IV.—VARIETY TESTS.

Variety tests were carried out in 1915, at 22 centres in 15 counties. The detailed results of these tests are published by Agricultural Instructors in their respective County Reports, but the average yield of grain and straw from all the centres are shown in the following Table :—

Variety.	Average Yield per Statute Acre, 1915.				
	Grain.		Straw.		
	cwt.	qr.	brls.	st.	cwt.
Waverley . . . . .	23	1	13	4	34
Black Tartarian . . . . .	22	2	12	12	34
Banner . . . . .	22	1	12	10	34
Yielder . . . . .	22	1	12	10	33
Abundance . . . . .	22	0	12	8	33
Potato . . . . .	20	2	11	10	34

These results approximate very closely to the average returns for the past nine years.

Four other tests with large scale plots of one acre each were carried out directly under the supervision of the Department. In these trials 7 varieties were included, five of which had been raised from selected single ears at Ballinacurra, Co. Cork, and the two others, viz.: Black Bell and Black Great Mogul, were obtained from the Plant Breeding Station at Svalöf, Sweden.

The following Table shows the returns per statute acre from the experiment carried out on the farm of Mr. R. K. Wright, Kilkea, Mageny, Co. Kildare. A similar test at the Albert Agricultural College, Glasnevin, Dublin, had to be abandoned as the plots became very badly laid by the July rains.

Variety.	Yield per Statute Acre		Value per barrel.	Value per acre excluding screenings	Value per acre including screenings.
	cwt. qr.	brls. st.	s. d.	£ s. d.	£ s. d.
Black Mogul	26 1	15 1	17 6	13 3 9	14 1 9
Victory	22 1	12 10	18 6	11 15 3	12 12 5
Banner	22 0	12 9	18 6	11 13 11	12 11 11
Abundance	21 1	12 3	18 6	11 6 0	12 0 7
Waverley	20 0	11 7	18 6	10 12 9	11 14 2

At this centre the crop was sown March 20th, the soil was a good loam, subsoil gravel and clay; the land was in grass in 1913 and 1914. The screenings were valued at 12s. per barrel.

Of the white oats, Victory proved slightly superior to Banner and Abundance, but the difference in yield was much less than in 1914. The variety Black Mogul cropped extremely well.

At two other centres three varieties of black oats were tested on plots of one statute acre each. The returns are given in the following Table:—

Centre.	BLACK TARTARY.				BLACK BELL.				BLACK GREAT MOGUL.						
	Average Yield per Statute Acre.														
	Grain.			Straw.	Grain.			Straw.	Grain.			Straw.			
	cwt.	qr.	brls.	st.	cwt.	cwt.	qr.	brls.	st.	cwt.	cwt.	qr.	brls.	st.	cwt.
Agricultural Station, Clonakilty, Co. Cork	21	3	12	6	—	23	1	13	4	—	24	3	14	2	—
T. P. McCarthy, Ballinacurra, Co. Cork	18	2	10	8	41	13	2	7	11	56	18	0	10	4	48

At both centres the previous crop was potatoes. The returns indicate that both the new varieties—Black Bell and Black Mogul—are worthy of trial in districts where black oats are grown.

#### V.—WINTER OATS.

In the autumn of 1914 plots with three varieties of oats were sown at 7 centres in the southern counties. Two of the varieties—Black Winter and Tawny—are already grown in some districts as winter oats, but the third variety—Black Tartarian—is usually regarded as suitable only for sowing in spring.

From one cause or another the results from only 3 centres can be regarded as reliable. The returns are given in the following Table :—

Centre.	BLACK WINTER.				TAWNY.				BLACK TARTARIAN.						
	Average Yield per Statute Acre.														
	Grain.		Straw.	Grain.		Straw.	Grain.		Straw.						
	cwt.	qr.	brls.	st.	cwt.	cwt.	qr.	brls.	st.	cwt.	cwt.	qr.	brls.	st.	cwt.
Umberaboy, Knocknagree, Co. Cork .	25	0	14	4	40	22	0	12	8	26	23	2	13	6	34
Lackenduff, Clonakilty, Co. Cork .	20	1	11	8	30	16	2	9	6	24	19	3	11	4	28
Ballyrannel, Glenbrien, Co. Wexford .	15	3	9	0	29	15	0	8	8	28	15	3	9	0	29
Average of 3 Centres	20	1	11	9	33	17	3	10	3	26	19	3	11	3	30

The Department are of opinion that the practice which prevails in Co. Wexford of sowing a considerable area with winter oats might with advantage be adopted in some of the other southern counties. The chief advantages of this system are that the pressure of work is relieved in spring, and as the crop ripens two or three weeks sooner than spring corn, the harvest is earlier and stubbles can be prepared for sowing catch crops in August or early September.

In these trials the best returns have been secured from Black Winter oats, while the Tawny oat has proved inferior to Black Tartarian. It is doubtful, however, whether the latter variety, except under favourable conditions of soil and climate, can be relied upon as a winter oat.

## MANURIAL TEST ON PEATY SOILS.

Table showing the Returns per Statute Acre from each Centre.

Centre.	Percentage of Organic Matter (Department's Analysis).	Plot 1.		Plot 2.		Plot 3.		Plot 4.		Plot 5.	
		No Manure.		3 cwt. Super-phosphate.		3 cwt. Super-phosphate, 2 cwt. Kainit.		1 cwt. Sulphate of Ammonia, 3 cwt. Super-phosphate, 2 cwt. Kainit.		1 cwt. Nitrate of Soda, 3 cwt. Superphosphate, 2 cwt. Kainit.	
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
Corriven, Blacklion, Co. Cavan.	28.56	cwt. 14 2	cwt. 19	qr. 19 0	cwt. 39	qr. 19 1	cwt. 38	qr. 18 1	cwt. 37	cwt. 18 2	cwt. 37
Falcarragh, Co. Donegal.	28.23	6 2	17	9 0	26	10 1	36	10 2	38	10 1	40
Claggan, Carrigart, Co. Donegal	29.89	11 1	33	12 0	38	13 0	40	16 0	47	15 2	50
Killycarrap, Lisnaskea, Co. Fermanagh.	34.43	8 1	19	19 3	34	19 1	38	18 2	41	18 0	40
Robertstown, Co. Kildare.	26.89	11 2	34	13 3	41	17 0	45	21 1	41	18 3	39
Park, Co. Londonderry.	20.15	7 2	20	8 3	24	9 1	24	10 2	34	10 2	35
Leckee, Foxford, Co. Mayo	24.16	15 1	27	17 2	37	18 3	38	19 0	41	21 0	45
Errow, Castlebar, Co. Mayo	20.91	10 3	20	19 2	31	20 1	32	21 2	35	22 0	41
Ennyvale, Co. Monaghan.	17.74	14 3	31	18 2	37	25 3	46	23 1	56	22 2	54
Average yield per Statute Acre (9 Centres)		11 1	24	15 1	34	16 3	37	17 3	41	17 2	42
Cost of Manures		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	
		0 10 6		0 16 6		1 12 0		1 8 6		1 8 6	
Value of Crop, less cost of Manures : Grain at 9d. per stone ; Straw at 1s. 6d. per cwt.,		5 3 6		6 12 0		6 19 6		6 16 0		6 19 6	
Do. Do. 1914. (7 Centres)		5 17 0		7 2 6		7 17 6		8 4 6		7 17 6	

## VI.—TURNIPS.

## I.—MANURIAL TEST (OLD SERIES).

Two series of experiments on the manuring of the Turnip crop were commenced in 1901, with the object of testing the effects of artificial manures ;—

- (a) In combination with farmyard manure ; and
- (b) Used alone.

The experiments, which were repeated for eleven consecutive years, were brought to a close in 1911.

The returns, which were remarkably uniform throughout the whole period, have been summarised in the briefest possible form in the following Tables :—

## MANURIAL TEST WITH FARMYARD MANURE.

A General Summary of the complete Series, including the Returns from 230 Centres during the eleven years 1901 to 1911 inclusive:—

	PLOT 1.	PLOT 2.	PLOT 3.	PLOT 4.	PLOT 5.	PLOT 6.
—	No Manure.	10 tons Farmyard Manure.	20 tons Farmyard Manure.	10 tons Farmyard Manure, 4 cwt. Super- phosphate.	10 tons Farmyard Manure, 4 cwt. Super- phosphate, 1 cwt. Sulphate of Ammonia.	10 tons Farmyard Manure, 4 cwt. Super- phosphate, 1 cwt. Sulphate of Ammonia 3 cwt. Kainit.
	Average yield per Statute Acre.					
Average of eleven years, 1901-1911 (230 Centres)	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
	6 5	19 0	23 0	23 16	24 19	26 0
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Value of Crop: Turnips at 8s. per ton, . . .	2 10 0	7 12 0	9 4 0	9 10 5	9 19 7	10 8 0
Average Cost of Manures, . . .	—	2 0 0	4 0 0	2 12 4	3 6 0	3 14 0
Value of Crop, less cost of Manures, . . .	2 10 0	5 12 0	5 4 0	6 18 1	6 13 7	6 14 0

## MANURIAL TEST WITHOUT FARMYARD MANURE.

A General Summary of the complete Series, including the Returns from 147 Centres during the eleven years 1901 to 1911 inclusive:—

	Plot 1. No Manure.	Plot 2. 4 cwt. Super- phosphate.	Plot 3. 4 cwt. Super- phosphate, 1 cwt. Sulphate of Ammonia.	Plot 4. 4 cwt. Super- phosphate, 1 cwt. Sulphate of Ammonia, 3 cwt. Kainit.
Average of eleven years, 1901-1911 (147 Centres)	Average yield per Statute Acre.			
	T. C. 4 17	T. C. 17 9	T. C. 18 19	T. C. 22 0
Value of Crop : Tur- nips at 8s. per ton,	£ s. d. 1 18 10	£ s. d. 6 19 7	£ s. d. 7 11 7	£ s. d. 8 16 0
Average Cost of Manures, .	—	0 12 4	1 6 0	1 14 0
Value of Crop, less Cost of Manures, .	1 18 10	6 7 3	6 5 7	7 2 0

Two further experiments were commenced in 1908, and as these were concluded in 1915, general deductions from all four experiments are given on pages 282-3.

## II.—MANURIAL TEST (NEW SERIES).

The objects of the two experiments in this series were:—

(a) To determine whether any advantage would be gained by increasing the quantity of superphosphate above 4 cwt. per statute acre, in combination with either dung or other artificial manures containing nitrogen and potash.

(b) To test basic slag against superphosphate in conjunction with farmyard manure and other artificial manures.

## SERIES A.—DUNG AND ARTIFICIAL MANURES.

During the past season these tests, in which superphosphate and basic slag were applied in conjunction with dung, were made at 29 centres in 16 counties.

The average results for 1915 and for the whole period of eight years, 1908-15, are summarised in the following Tables:—

(a) Varying Quantities of Superphosphate.

Plot	Manures applied per Statute Acre.	1915. (29 Centres.)		Average for 8 years, 1908-15. (270 Centres.)	
		Average yield per Statute Acre.	Average value of Crop less cost of Manures.	Average yield per Statute Acre.	Average value of Crop less cost of Manures.
		T. C.	£ s. d.	T. C.	£ s. d.
1	4 cwt. Superphosphate, with Dung.	22 10	5 6 0	22 15	5 8 0
2	5 cwt. Superphosphate do.	23 6	5 8 11	23 11	5 10 11
3	6 cwt. Superphosphate do.	24 6	5 13 5	24 5	5 13 0

(b) Varying Quantities of Basic Slag.

Plot.	Manures applied per Statute Acre.	1915. (29 Centres.)		Average for 8 years, 1908-15. (270 Centres.)	
		Average yield per Statute Acre.	Average Value of Crop less cost of Manures.	Average yield per Statute Acre.	Average Value of Crop less cost of Manures.
		T. C.	£ s. d.	T. C.	£ s. d.
4	4 cwt. Basic Slag, with Dung.	22 4	5 3 7	22 14	5 7 7
5	5 cwt. Basic Slag do.	23 8	5 9 8	23 7	5 9 4
6	6 cwt. Basic Slag do.	24 5	5 13 0	24 2	5 11 10

SERIES B.—ARTIFICIAL MANURES USED ALONE.

In 1915 these experiments with artificials alone were carried out at 27 centres in 15 counties. The average results for the past season, and for the whole period of eight years, 1908-15, are shown in the following Tables:—

## (c) Varying Quantities of Superphosphate.

Plot.	Manures applied per Statute Acre.	1915. (27 Centres.)		Average for 8 years, 1908-15. (176 Centres.)	
		Average yield per Statute Acre.	Average value of Crop less cost of Manures.	Average yield per Statute Acre.	Average value of Crop less cost of Manures.
1	4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia and 3 cwt. Kainit,	T. C.	£ s. d.	T. C.	£ s. d.
		23 13	7 10 8	22 10	7 1 6
2	5 cwt. Superphosphate do.	24 8	7 13 2	23 12	7 6 10
3	6 cwt. Superphosphate do.	25 8	7 17 8	24 10	7 10 6

## (d) Varying Quantities of Basic Slag.

Plot	Manures applied per Statute Acre.	1915. (27 Centres.)		Average for 8 years, 1908-15. (176 Centres.)	
		Average yield per Statute Acre.	Average value of Crop less cost of Manures.	Average yield per Statute Acre.	Average value of Crop less cost of Manures.
4	4 cwt. Basic Slag, 1 cwt. Sulphate of Ammonia and 3 cwt. Kainit,	T. C.	£ s. d.	T. C.	£ s. d.
		23 16	7 11 11	22 1	6 17 11
5	5 cwt. Basic Slag do.,	25 0	7 18 0	23 1	7 2 5
6	6 cwt. Basic Slag do.,	25 10	7 18 6	23 17	7 5 4

Since 1912 an extra plot, No. 7, has been included in this series, with the object of showing the effect of applying three-quarters of the amount of the standard mixture of artificials used on plot 1. The results of this test for the past four seasons are shown in the following Table :—



## (e) Varying Quantities of the Standard Mixture.

Plot	Manures applied per Statute Acre.	1915. (27 Centres.)		Average for 4 years, 1912-15. (97 Centres.)	
		Average yield per Statute Acre.	Average value of Crop less cost of Manures.	Average yield per Statute Acre.	Average value of Crop less cost of Manures.
		T. C.	£ s. d.	T. C.	£ s. d.
1	4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia, 3 cwt. Kainit (full dressing),	23 13	7 10 8	22 2	6 18 4
7	6 cwt. of above mixture (three-quarter dressing)	22 5	7 9 2	20 16	6 17 7

In the foregoing Tables the following prices per ton have been used in estimating the value of the crop:—turnips, 8s.; superphosphate, £3 10s.; basic slag, £3 10s.; sulphate of ammonia, £15 10s.; kainit, £3; farmyard manure, 4s. With regard to the cost of the artificial manures, it may be mentioned that during the first two or three years in which these tests were in progress, prices were appreciably less than those set forth above, and that in 1915, owing to the war, sulphate of ammonia was rather dearer than the price charged, while kainit was much more costly, and was practically unobtainable.

*Conclusions.*—The results of both the Old and New Series of Experiments indicate:—

(1) That though good crops of turnips may be grown with farmyard manure alone, it is not economical to apply heavy dressings.

(2) That a medium dressing of farmyard manure, say from 10 to 15 tons per statute acre, supplemented by superphosphate or basic slag, is better than a heavy dressing of dung alone.

(3) That of the three kinds of artificial manures, nitrogenous, phosphatic and potassic, phosphatic manures alone materially increase the yield. When a medium dressing of dung supplemented by superphosphate or basic slag is used, it is very doubtful whether the addition of either sulphate of ammonia, or kainit, or both, will pay. But when no dung is used it is advisable to apply these manures along with superphosphate or basic slag.

The use of a complete mixture has one decided advantage, in-

asmuch as a more even braird is obtained, the plants are stimulated in their early growth, and consequently suffer less injury from attacks of the turnip fly.

(4) That superphosphate and basic slag are practically of equal value as manures for turnips. The question as to which should be used to supplement dung must be decided by local circumstances, but where the land is deficient in lime, or where the disease "Finger and Toe" is prevalent, basic slag should undoubtedly be applied.

(5) That as much as 6 cwt. per statute acre of either manure may be used with satisfactory results. Especially is this the case when no farmyard manure is applied.

(6) That, under ordinary conditions, the following manurial dressings may be thoroughly relied upon to give satisfactory results :—

(a) A medium dressing, from 10 to 15 tons, of farmyard manure supplemented with from 4 to 6 cwt. of superphosphate or basic slag per statute acre ; or

(b) From 6 to 8 cwt. per statute acre of the following mixture of artificials used without farmyard manure :—

4 to 6 cwt. of Superphosphate or Basic Slag,

1 cwt. Sulphate of Ammonia,

3 cwt. Kainit,

*Basic slag must on no account be mixed with sulphate of ammonia.*

### III.—MANURIAL TESTS ON PEATY SOILS.

These tests were commenced in 1912, and have been repeated each year since, with a view to ascertaining the best method of manuring turnips on pronounced peaty soils.

In 1915 tests were made at 8 centres in 7 counties. The detailed results are given on page 286, but the figures for the past season and the three previous years are summarised in the following Table :—

[TABLE.]

Plot.	Manures applied per Statute Acre.	1915 (8 Centres)		Average of three years, 1912-14 (16 Centres).	
		Average yield per Statute Acre.	Average value of Crop, less cost of Manures.	Average yield per Statute Acre.	Average value of Crop, less cost of Manures.
1	15 tons Farmyard Manure,	T. C.	£ s. d.	T. C.	£ s. d.
2	15 tons Farmyard Manure, 4 cwt. Superphosphate,	20 7	5 2 10	17 14	4 1 6
3	15 tons Farmyard Manure, 4 cwt. Basic Slag,	23 15	5 16 1	21 15	5 0 0
4	15 tons Farmyard Manure, 4 cwt. Superphosphate, 2 cwt. Kainit,	22 16	5 8 5	22 8	5 5 3
5	15 tons Farmyard Manure, 4 cwt. Superphosphate, 2 cwt. Kainit,	24 12	5 16 10	23 12	5 8 11
6	15 tons Farmyard Manure, 4 cwt. Basic Slag, 2 cwt. Kainit,	23 17	5 10 10	23 1	5 4 3
7	4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia, 3 cwt. Kainit,	23 15	7 11 6	22 2	6 18 5
8	4 cwt. Basic Slag, 1 cwt. Sulphate of Ammonia, 3 cwt. Kainit,	20 8	6 4 8	22 1	6 18 1

It is noticeable that in the past season superphosphate has proved decidedly superior to basic slag, both in combination with dung and with other artificial manures, whereas, the average results for the three previous years do not show any appreciable difference in the value of these manures for turnips on peaty soils.

The application of 2 cwt. kainit per statute acre, along with dung and superphosphate or basic slag has, on the average, increased the yield sufficiently to repay the cost of the kainit, but its use has not proved very profitable.

Very satisfactory crops have been obtained from the use of a complete mixture of artificial manures without dung.

#### IV.—VARIETY TEST.

The object of this experiment was to test the cropping powers of different varieties of swedes and yellow turnips.

Experiments were carried out at 41 centres in 21 counties by Agricultural Instructors, and by Agricultural Overseers at 41 centres in Congested Districts.

The average results of these tests in 1915, and the five previous years, are given in the following Tables :—

### County Experiments.

Variety.	Average yield per Statute Acre, 1915. (41 Centres.)		Average yield per Statute Acre, 1910-14. (135 Centres.)	
SWEDIS.		T. C.	T. C.	
Best of All	.	25	12	23 19
Triumph	.	25	3	24 3
Magnum Bonum	.	24	18	24 5
Incomparable Green Top	.	24	16	23 13
Shamrock	.	23	19	*23 0
Improved Purple Top	.	22	17	22 19
YELLOW TURNIPS				
Centenary	.	29	15	†30 1
Aberdeen Green Top	.	26	3	†24 16

\* Average of 30 centres (1914) only. † Average of 128 centres only.

### Congested Districts' Experiments.

Variety.	Average yield per Statute Acre, 1915. (41 Centres.)		Average yield per Statute Acre, 1910-14. (185 Centres.)	
SWEDES.		T. C.	T. C.	
Triumph,	.	28	5	25 15
Magnum Bonum,	.	27	8	25 0
Best of All,	.	26	18	25 16
Shamrock,	.	26	13	23 10*
Abundance,	.	26	8	24 6
Incomparable Green Top,	.	25	19	24 11
Whitsuntide Bronze Top,	.	25	19	24 7

\* Average of 42 centres (1914) only.

As in previous years the varieties Magnum Bonum, Triumph, and Best of All have given the best results, and these kinds may be regarded as reliable general-purpose swedes. Incomparable Green Top and Whitsuntide Bronze Top are good keeping swedes, but not quite such heavy croppers as the three purple topped varieties mentioned.

Of the Yellow turnips Centenary has almost uniformly produced considerably heavier crops than Aberdeen Green Top. Centenary should be used early.

## MANURIAL TESTS ON PEATY SOILS.

Table showing the Returns per Statute Acre from each Centre.

CENTRE.	Percentage of Organic Matter (Department's Analysis.)	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7
		15 tons Farmyard Manure.	15 tons Farmyard Manure, 4 cwt. Superphosphate.	15 tons Farmyard Manure, 4 cwt. Slag.	15 tons Farmyard Manure, 1 cwt. Superphosphate, 2 cwt. Kainit.	15 tons Farmyard Manure, 4 cwt. Slag, 2 cwt. Kainit.	4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia, 3 cwt. Kainit.	4 cwt. Slag, 1 cwt. Sulphate of Ammonia, 3 cwt. Kainit.
Church Cross, Co. Cork Kingwilliamstown, do., Innismore, Co. Fermanagh, 7 Listowel, Co. Kerry, Johnstown, Co. Kilkenny, Crossmolina, Co. Mayo, Carrickmacross, Co. Monaghan, Maryborough, Queen's Co.	10.00	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
	21.78	31 3	36 17	36 6	35 17	34 17	36 17	29 0
	33.30	25 6	25 16	27 1	26 3	27 10	28 3	25 17
	25.38	17 6	21 13	18 0	21 7	19 3	15 8	12 4
	11.40	21 5	23 10	23 1	23 18	24 7	28 2	26 17
	15.72	12 7	13 10	13 11	15 9	14 4	12 4	9 16
	21.72	26 6	29 16	28 16	31 19	30 3	30 12	29 5
Average yield per Statute Acre, Cost of Manures, . . . . Value of Crop, less Cost of Manures : Turnips at 8s. per ton, . . . .	18.59	15 2	20 3	18 6	22 15	21 4	21 9	15 14
		13 16	18 17	17 4	19 9	19 6	17 4	14 8
Average yield per Statute Acre, Cost of Manures, . . . . Value of Crop, less Cost of Manures : Turnips at 8s. per ton, . . . .		T. C.	T. C.	T. C.	T. C.	T. C.	T. C.	T. C.
		20 7	23 15	22 16	24 12	23 17	23 15	20 8
		£ s. d. 3 0 0	£ s. d. 3 14 0	£ s. d. 3 14 0	£ s. d. 4 0 0	£ s. d. 4 0 0	£ s. d. 1 18 6	£ s. d. 1 18 6
Average yield per Statute Acre, Cost of Manures, . . . . Value of Crop, less Cost of Manures : Turnips at 8s. per ton, . . . .								
		5 2 10	5 16 0	5 8 5	5 16 10	5 10 10	7 11 6	6 4 8

## VII.—WHEAT.

The wheat variety tests carried out in 1915 consisted of two series.

## SERIES I.—LARGE SCALE EXPERIMENTS.

The tests in this series were made at 3 centres, and in every case the plots were one statute acre in area.

At two centres the object was to compare Queen Wilhelmina with White Stand Up and Square Head Master. Red Fife was also included at one of these centres.

The results are shown in the following Table :—

Centre and Date sown.	WHITE STAND UP.					QUEEN WILHELMINA.				
	Yield per statute acre.	Value per barrel	Value per acre.	Value per acre including screenings.		Date sown.	Yield per statute acre.	Value per barrel	Value per acre.	Value per acre including screenings.
1. Albert Agricultural Coll., Glasnevin 10th Dec., 1914	11 0	23 0	15 8	0 16 8 0		11th Feb., 1915	10 8	25 6	13 5	2 14 4 2
2. R. K. Wright, Kilkea, Co. Kildare Nov., 1914	10 4½	27 0	13 16	1 14 2 1		Nov., 1914	10 16	27 6	14 11	7 15 1 7
Average value per acre of 2 Centres					£15 5 0	£14 12 10				
	SQUARE HEAD MASTER.					RED FIFE.				
	Yield per statute acre.	Value per barrel	Value per acre.	Value per acre including screenings.		Date sown.	Yield per statute acre.	Value per barrel	Value per acre.	Value per acre including screenings.
1. Albert Agricultural Coll., Glasnevin 10th Dec., 1914	11 4	27 6	15 8	0 16 7 6		13th Mar., 1915	6 8	23 0	8 19	2 9 10 2
2. R. K. Wright, Kilkea, Co. Kildare Nov., 1914	9 11	24 0	11 9	2 11 15 2		—	—	—	—	—
Average value per acre of 2 Centres					£14 1 1					

The Screenings were valued at 1s. per stone.

The Square Head Master at Centre 2 was badly infected by Smut, hence the low value assigned to it.

The outstanding feature of the above Table is the low place taken by Red Fife, and attention is directed to the remark concerning it in the Report on the Wheat Experiments for 1914, where it is described as "Incapable of withstanding the effects of anything

approaching the nature of stagnant water, and is consequently well suited to light gravelly well drained soils." The soil at Glasnevin is probably too heavy for Red Fife, and it may have retained too much moisture after the wet winter of 1914-15. Queen Wilhelmina, sown in spring, was inferior to Square Head Master and White Stand Up at Centre 1, whereas when sown in autumn at Centre 2 it was superior to both.

The third experiment at Messrs. Brown and Crosthwait's farm, Bagenalstown, Co. Carlow, was arranged to compare the varieties Queen Wilhelmina and Red Chaff White sown in autumn with three spring wheats, viz., Red Fife, Bearded Wheat similar to Red Fife, and a new Canadian spring wheat called Marquis. The plots of the two former varieties were duplicated, and the average of the two plots in each case is taken for purposes of comparison. The soil of the field is a light gravelly loam and the subsoil limestone gravel, the previous crops having been roots in 1914 and oats in 1913. The following Table shows the yields and values :—

Variety.	Date Sown.	Yield per acre.	Value per barrel.	Value per acre.	Screen- ings.	Value per acre including Screenings.
		brls. sts.	s. d.	£ s. d.	sts.	£ s. d.
Red Chaff White .	Nov., 1914	9 10	27 6	13 1 3	4	13 5 3
Queen Wilhelmina	Nov., 1914	9 1	27 0	12 4 4	5	12 9 4
Red Fife . . .	April, 1915	8 9	30 0	12 3 6	3	12 6 6
Marquis . . .	April, 1915	7 5	29 0	10 10 3	10	11 0 3
Bearded Wheat .	April, 1915	5 0	22 0	5 10 0	17	6 7 0

The autumn sown wheats, Red Chaff White and Queen Wilhelmina, come out best, although Red Fife on account of its higher value per barrel approximates closely to the latter. The Bearded Wheat was bad in every way and will be discarded. Marquis produced a good sample, and should be further cultivated. It is a red wheat similar to Red Fife in appearance, and though not maturing earlier on this farm it appeared to be somewhat earlier at Ballinacurra where a small quantity was grown as a pure line cultivation.

#### SERIES II.—SMALL SCALE EXPERIMENTS.

These experiments were carried out by Agricultural Instructors at 33 centres in 19 counties.

The results are given in the following Table:—

Centre.	Character of Soil.	White Stand-Up.		Square Head Master.		Queen Wilhelmina.	
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
St. Patrick's Seminary, Armagh	Rich Loam	cwt. 31	qr. 1	cwt. 28	qr. 0	cwt. 29	qr. 0
Knappagh, Killylea, do.	Medium Loam	21	3	18	1	18	3
Ardnehue, Co. Carlow	Heavy Loam	19	0	18	2	18	3
Grange, Tullow, do.	Medium Loam	19	1	16	2	18	0
Ballymacahill, Ennis, Co. Clare	Light Loam	31	2	27	0	30	0
Lack West, Kilmihil, do.	Loam	27	2	25	1	27	1
Glinney, Riverstick, Co. Cork	Gravelly Loam	25	2	24	2	32	0
Kilblaffer, Berrings, do.	Clay Loam	24	3	23	0	27	3
Ballinabard, Rossmore, do.	Medium Loam	27	0	17	0	28	1
Boyagh, Porthall, Co. Donegal	Peaty Loam	20	0	19	3	19	0
Kildoney, Ballyshannon, do.	Loam	23	2	26	2	28	0
Killykerran, Brookboro, Co. Fermanagh	Strong Loam	17	1	16	1	17	2
Gortdromagowna, Newtownsandes, Co. Kerry	Strong Loam	22	2	20	2	20	3
Kilree, Stonyford, Co. Kilkenny	Loam	20	1	22	2	20	0
Belview, Croom, Co. Limerick	Clay	35	3	28	3	31	2
Ballinamona, Knocklong, do.	Loam	26	3	28	0	30	0
Direen, Athea, do.	Loam	25	3	24	0	30	2
Brickfield, Kilmallock, do.	Clay Loam	27	0	26	2	28	2
Gortanewry, Moneymore, Co. Londonderry	Medium Light Dry	30	0	27	1	28	2
Gurteenboy, Ballycormick, Co. Longford	Heavy Loam	27	1	28	1	25	0
Newtown, Drogheda, Co. Louth	Clay Loam	26	3	25	3	27	2
Shanliss, Ardee, do.	Light Clay Loam	20	1	23	2	26	2
Tonroe, Killala, Co. Mayo	Medium Clay	25	1	21	3	28	0
Ballyhankeen, Scardane, do.	Limestone	27	1	22	1	26	2
Coolderry, Carrickmacross, Co. Monaghan	Clay Loam	21	3	24	2	21	0
Sleaty House, Graigue, Queen's County	Good Clay Loam	31	0	28	1	30	1
Lackin, Templemore, Co. Tipperary	Clay Loam	24	2	22	3	28	0
Moonaloughre, do.	Clay Loam	30	0	28	2	29	1
Bawnmore, do.	Loam	30	2	29	3	31	3
Drumillard, Rock, Dunganon, Co. Tyrone	Clay	18	2	18	2	23	1
Carn Park, Moate, Co. Westmeath	Medium Loam	19	0	22	0	20	0
Rahugh House, Kilbeggan, Co. Westmeath	Clay Loam	39	0	43	0	41	0
Annestown, New Ross, Co. Wexford	Clay Loam	21	2	19	1	23	1
Average yield per statute acre 33 centres .		25	2	24	0	26	1
Average yield of grain per statute acre in barrels of 20 stones		brls. 10	sts. 4	brls. 9	sts. 12	brls. 10	sts. 10

#### REMARKS.

In these tests Queen Wilhelmina has given a slightly heavier average yield than White Stand Up, and has proved distinctly superior to Square Head Master. These three varieties generally



give the best results when sown in autumn, and while none of them can be regarded as of first-rate milling quality they are heavy yielding kinds suitable for general cultivation.

It may be noted that at one centre in the large scale experiments Red Chaff White gave a higher yield than Queen Wilhelmina, but in past seasons in the Department's experiments this wheat has not proved as satisfactory as the three varieties already mentioned.

Red Fife is essentially a spring wheat and especially suitable to light soils. Although less productive than the three winter wheats mentioned above its early ripening properties render it a valuable variety, when weather or other conditions make autumn sowing impossible and spring sowing necessary.

#### MANURING.

When sown after roots, it is not necessary to use any artificial manure with wheat, except in the event of the plants tillering badly, or of a severe wireworm attack, when 1 cwt. of nitrate of soda per statute acre may be profitably applied. If wheat is sown after another corn crop, a dressing of from 2 to 3 cwt. superphosphate, and, if the land is light, 2 to 3 cwt. kainit, per statute acre might be applied at the time of sowing the seed. This should be supplemented in spring with about 1 cwt. nitrate of soda per statute acre.

#### DRESSING OF WHEAT SEED FOR THE PREVENTION OF SMUT.

The presence of smut in a crop of wheat not only involves a loss to the farmer in yield, but has a detrimental effect on the quality of the produce. It is therefore extremely desirable to adopt some precautionary methods for the prevention of smut. One of the simplest of these is to dress the seed before sowing with copper sulphate solution in the following manner:—Dissolve  $\frac{1}{2}$  lb. of copper sulphate in 1 gallon of water, which quantity of solution is sufficient to dress 20 stones of wheat. The corn should be spread out on a clean loft floor, and the solution may then be carefully sprinkled over it, and the whole repeatedly turned until each grain receives a coating of liquid. When this is done the wheat should be spread out in a thin layer and left to dry. If necessary it may be turned again. The operation should be carried out just immediately previous to sowing, and under no consideration should an attempt be made to sow the wheat before it is absolutely dry.

*Copies of these reports in leaflet form (Nos. 36 to 41 and 61) may be obtained, free of charge, and post free, on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped.*

## FOURTH IRISH EGG-LAYING COMPETITION.

### FIRST QUARTERLY REPORT.

1ST OCTOBER TO 31ST DECEMBER, 1915.

The fourth eleven-months Laying Competition began at the Munster Institute, Cork, on October 1st, 1915.

There are thirty-three competing pens of the following breeds:—

White Wyandottes	. . .	14 pens
Rhode Island Reds	. . .	9 pens
White Leghorns	. . .	4 pens
Minorcas	. . .	3 pens
Red Sussex	. . .	1 pen
Buff Orpingtons	. . .	1 pen
Faverolles	. . .	1 pen

In addition to the above, there are sixteen non-competing pens included in the test.

It is gratifying to be able to report a further improvement in the quality of the pullets. The leading pens of

**The Quality of the Birds.** White Wyandottes and White Leghorns were in splendid condition on arrival. Some of the Rhode Island Reds were also well reared, but many of them were backward owing to late hatching. There are many pullets of good quality amongst them, and some of the pens of this breed are likely to improve their position as the competition goes on.

The White Leghorns are the best yet received. Some early birds in the competing and non-competing pens have moulted and so spoiled their records for this quarter.

**Cost of Food.** The food bill is the highest yet reached in any period of thirteen weeks, amounting to a total of £31 15s. 5d. for the 294 birds.

The Return for Eggs.      The return for eggs is also high, amounting to £91 14s. 8d.

These figures effectively dispose of the contention that eggs cannot be produced at a profit while poultry foods are so expensive.

As in former years, the plainest of foods are being used. The following are the kinds of food and the quantity of each used for the thirteen weeks:—

Oats . . . . .	3,042 lbs.
Bran and Pollard . . . . .	1,374 „
Indian Meal . . . . .	1,392 „
Cracked Maize . . . . .	835 „
Dried Grains . . . . .	329 „
Fish Meal . . . . .	360 „
Malt Culms . . . . .	32 „
Soya Bean Meal . . . . .	183 „
Potatoes . . . . .	582 „

The small potatoes and dried grains have been used to reduce the cost.

It was found impossible to procure oyster shell or any substitute, such as “cal-carb,” so ordinary well-slaked Shell Material. lime, which has been exposed to the weather since September, is being used. The result is quite satisfactory, and the cost only a fraction of that of oyster shell.

COMPETING PENS.—TABLE A.

Order of Merit.	No. of Pen.	Breed.	No. of Eggs laid.	Value of Eggs laid.
1	25	White Wyandotte	350	£ 8. d. 3 6 5½
2	27	" "	347	3 6 0
3	34	" "	309	2 16 7
4	33	" "	302	2 14 6
5	26	" "	285	2 14 4
6	32	" "	280	2 14 3
7	29	" "	287	2 12 3½
8	35	" "	261	2 8 11½
9	5	White Leghorn	263	2 8 5
10	30	White Wyandotte	248	2 8 0
11	22	" "	252	2 7 6½
12	4	White Leghorn	260	2 6 3½
13	9	Buff Orpington	227	2 4 8
14	18	Rhode Island Red	218	2 4 3½
15	1	Black Minorca	226	2 4 1½
16	12	Rhode Island Red	202	2 1 4½
17	7	White Leghorn	211	1 19 4
18	17	Rhode Island Red	185	1 18 0½
19	28	White Wyandotte	190	1 16 10½
20	23	" "	195	1 15 11
21	3	Black Minorca	172	1 13 4½
22	10	Red Sussex	167	1 11 11
23	15	Rhode Island Red	166	1 11 4½
24	6	White Leghorn	140	1 6 11½
25	11	Salmon Faverolle	109	1 1 1½
26	31	White Wyandotte	101	1 0 1½
27	2	Black Minorca	98	0 19 6½
28	19	Rhode Island Red	94	0 19 0
29	14	" "	89	0 18 2½
30	21	" "	89	0 18 0½
31	13	" "	82	0 16 8½
32	24	White Wyandotte	80	0 15 11½
33	16	Rhode Island Red	80	0 14 0½

NON-COMPETING PENS.—TABLE B.

1	43	Rhode Island Red	244	2 7 8½
2	45	" "	255	2 7 7
3	42	White Leghorn	244	2 3 10
4	36	Barred Rock	239	2 2 8½
5	46	Rhode Island Red	237	2 1 6
6	38	Red Sussex	203	2 0 11
7	37	" "	208	2 0 8
8	41	White Leghorn	226	2 0 6½
9	39	Rhode Island Red	216	1 18 3½
10	20	" "	175	1 14 8½
11	40	" "	187	1 14 0½
12	44	" "	177	1 12 3
13	8	White Leghorn	146	1 9 2
14	47	Rhode Island Red	119	1 4 4½
15	48	" "	114	1 1 7
16	49	" "	100	1 0 1

## EGG RECORDS FOR THE YEAR 1914-15.

In the issues of the Department's JOURNAL, Vol. VIII., No. 4, and Vol. IX., Nos. 1, 3 and 4, articles appeared pointing out the need and use of egg records; and an article specially devoted to the keeping of egg records on the trap nest system was published in the JOURNAL, Vol. X., No. 2. Details of the results of the keeping of egg records during the year 1908-9 were published in the JOURNAL, Vol. X., No. 3; for the year 1909-10 in the JOURNAL, Vol. XI., No. 1; for the year 1910-11 in the JOURNAL, Vol. XII., No. 2; for the year 1911-12 in the JOURNAL, Vol. XIII., No. 2; for the year 1912-13 in the JOURNAL, Vol. XIV., No. 1, and for the year 1913-14 in the JOURNAL, Vol. XV., No. 2. The following article gives similar particulars of the results obtained during the year 1914-15.

In all, the appended Tables (pp. 298 *et seq.*) give particulars of 103 flocks, but of these only 77 are complete annual records, as some of the record keepers did not send returns throughout the whole of the period, and others of them broke up their pens or changed their breeds during the year.

The general average for the flocks is rather more than 112 eggs per bird per annum.

Looking somewhat more closely into the returns it is seen that one flock of birds gave the exceptional result of **Some Results.** over 200 eggs per bird per annum. In addition, one flock gave over 190 eggs per bird, two over 170, three over 160, two over 150, eight over 140, six over 130, seven over 120, and ten over 110 eggs per bird.

In all, 37 flocks gave over the general average, and 40 less than the average. Out of the 77 flocks, 49, or about 64 per cent., gave over 100 eggs per bird during the year.

The results obtained can be seen in detail from the accompanying Table:—

TABLE A.

Name of Breed.	Average of all the flocks.*	Average of best flock.	Average of worst flock.
White Leghorns, . . .	157.4	199.6	136.0
Minorcas, . . .	144.0†	165.7	118.1
Buff Orpingtons, . . .	107.6‡	124.5	—
White Orpingtons, . . .	85.7‡	138.2	84.5
White Wyandottes, . . .	99.6	113.2	86.2
Faverolles, . . .	96.1	109.9	74.4
Plymouth Rocks, . . .	95.2	140.2	61.5
Houdans, . . .	125.7†‡	125.7†	125.7†
Rhode Island Reds, . . .	107.9	149.7	83.1
Light Sussex, . . .	92.4†	88.4§	73.5
Red Sussex, . . .	87.2†‡	87.2†	87.2†
Mixed Breeds, . . .	115.9	205.7	48.3
All kinds, . . .	112.8	205.7	48.3

\* For the number of Birds of each Breed see Tables, pp. 298 *et seq.*

† One flock only.

‡ These records relate to less than 100 hens.

§ The Record of the most successful flock is incomplete. || Record incomplete.

This Table shows some striking facts. Thus, while White Leghorns had the good average of 157.4 eggs per bird, the best flock of this breed gave the excellent result of 199.6 eggs per bird, while the worst flock had the average of 136.0 eggs per bird. Similarly, Plymouth Rocks with the return of 95.2 eggs per bird had a best flock giving the result of 140.2 eggs per bird, whilst the worst flock gave the poor result of 61.5 eggs per bird. Rhode Island Reds, which showed the average of 107.9 eggs per bird for all flocks, had the good result of 149.7 eggs per bird for the best flock, and 83.1 eggs per bird for the worst. Again, Mixed Breeds, with the fair result of 115.9 eggs per bird for all the flocks, had the excellent result of 205.7 eggs per bird for the best flock, but the low result of 48.3 eggs per bird for the poorest flock.

Breeds that did well were White Leghorns and Minorcas. Houdans also gave a satisfactory result, but there is only one complete record. On the other hand, the results obtained from Faverolles and Plymouth Rocks were disappointing.

For the purposes of contrast, the general averages for the years 1909-10 to 1914-15 are set forth below:—

TABLE B.

Name of Breed.	Average for the Year.					
	1914-15	1913-14.	1912-13.	1911-12.	1910-11.	1909-10.
White Leghorns, . . .	157.4	140.5	134.2	131.4	119.7	120.7
Brown Leghorns, . .	—	106.8	149.6	130.0	122.9	.0
Minorcas, . . .	144.0	147.1	204.7	131.9	133.0	123.4
Buff Orpingtons, . .	107.6	120.7	113.9	102.3	102.1	104.2
White Orpingtons, . .	85.7	97.0	108.8	112.5	116.8	105.5
White Wyandottes, . .	59.6	94.5	102.2	115.1	106.5	90.5
Faverolles, . . .	96.1	93.8	102.4	81.4	95.0	105.1
Plymouth Rocks, . .	95.2	99.5	107.3	95.2	112.8	117.8
Houdans, . . .	125.7	126.1	158.5	142.0	159.4	127.8
Rhode Island Reds, . .	107.9	120.9	122.3	138.8	128.5	—
Light Sussex, . . .	92.4	117.5	95.3	96.9	87.9	83.9
Red Sussex, . . .	87.2	—	—			
Mixed Breeds, . . .	115.9	112.0	112.1	109.0	111.6	112.0
All kinds, . . .	112.8	111.5	112.5	108.4	110.3	111.1

It will be seen that all the flocks taken together gave a slightly higher result than the average for the six years. The outstanding feature of the returns, however, is the practical identity of the figures—the records being as under:—

Records for the  
years 1909-10  
to 1914-15  
contrasted.

1909-10 ..	111.1	1912-13 ..	112.5
1910-11 ..	110.8	1913-14 ..	111.5
1911-12 ..	108.4	1914-15 ..	112.8

Table B. shows the general results, but poultry-keepers would

**The  
Importance  
of Strain.**

do well to examine the records of each pen of birds, and not only the returns of the best pens. They should consider also the general averages shown by the breeds. Doing so will enable them more profitably to compare the different breeds, and will also bring out clearly the great value of strain as against breed. In fact, it will be evident that strain, as far as egg production is concerned, is at least as important as breed. An examination of the Tables shows that there are very great variations indeed between the results shown by the best-laying strains and the worst-laying strains. This can clearly be seen in the figures in Table A. Some salient facts may be pointed out. Thus, we have a flock of White Leghorns giving the excellent average of 199 eggs per bird per annum, as contrasted with another flock of birds of the same breed which yielded only 136 eggs per bird per annum. Similar variations are shown in other breeds. One flock of Mixed Breeds has the excellent result of 205 eggs per bird per annum, and another flock has the very poor result of 48 eggs per bird per annum. Again, one flock of Plymouth Rocks has the good return of 140 eggs per bird, and another the poor result of 61 eggs per bird. A close examination of the returns will show many similar variations. It is not intended to claim that all the differences in results are solely due to strain, but the fact that such variations occur in all the breeds points to the conclusion that strain is the predominant cause of the wide variation.

The second lesson taught by the Tables is the great value of egg-

**The Value of  
Records.**

laying records. For it will undoubtedly give for thought when it is realised that one poultry-keeper may obtain an average yield of over 200 eggs per bird per annum, while another poultry-keeper gets only about one-quarter that number of eggs. These figures, and others like them which occur frequently throughout the returns, will give a poultry-keeper, whose birds are showing results below the average, much reason to look carefully into his choice of birds and his method of keeping them.

An average of 112 eggs per annum for birds kept under farming conditions—the general average shown for all birds in these returns—may be satisfactory up to a point, and it is undoubtedly above the general average of the country; but when results as high as those obtained by some of the more successful poultry-keepers can be attained, there is very considerable scope for improvement by the poultry-keeper whose results are only up to the average.

It is not easy to estimate the average cost of a hen for a year, as conditions differ materially. For instance, on a farm hens pick up a good deal of food and consequently they can be fed more cheaply than in cases where all their food has to be purchased.

**Profit  
and Loss.**

The cost of keeping hens will thus vary considerably—from very little to 7s. or 8s. per hen per year. The variations of cost being so wide, it is difficult to strike an average. Probably the average cost per hen for food from first to last is from 3s. 6d. to 8s. per year. Just as the cost of keeping hens varies, so also the prices obtained for eggs differ considerably; but if the price received be taken at, say, one shilling and threepence a dozen all the year round—a fair average price, though in the present exceptional conditions higher prices range—it will be seen that, to merely cover cost of food, a hen must lay not less than 60 eggs a year, and, if some slight profit and return for the care given is to be obtained, each hen should lay not less than 80 eggs per annum. Now, when we have in our returns a pen giving results as low as 48 eggs per annum, there is good reason to believe that there must be many flocks, or at least very many birds, giving averages below 60 eggs per hen per annum, and, therefore, hens which are being kept at no profit and perhaps at a loss. These considerations will show how important it is for every poultry-keeper to carefully watch the egg-production of his fowl, and the attention that should be given to the selection of birds of good egg-laying strains. Both these facts emphasize the necessity of keeping egg records.

As will be seen from the attached Tables (pp. 298, *et seq.*) a considerable number of egg records are being kept in Ireland, but it is very desirable that the number should be greatly increased.

*The Department, therefore, wish to know of farmers and other poultry-keepers who are willing to keep Egg Records. An Egg Record Book in which returns can be kept will be sent free to all applicants. Applications, which need not be stamped, should be addressed to The Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin.*



## EGG RECORDS.—

## SUMMARY

Name of Breed.	October.		November.		December.		January.		February.		March.	
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.
White Leghorns .	182	4.8	193	4.1	263	4.9	230	8.2	232	8.0	250	19.5
Minorcas, .	55	7.5	86	4.1	88	3.3	87	5.2	98	8.6	86	18.2
Buff Orpingtons, .	30	7.4	62	3.3	63	6.9	70	6.4	69	6.6	65	12.2
White Orpingtons, .	53	4.0	96	1.4	98	2.5	99	5.9	93	8.0	88	13.6
White Wyandottes, .	141	3.9	149	2.0	173	2.5	172	5.0	175	7.5	176	14.9
Faverolles, .	181	2.6	218	1.0	205	1.7	169	4.1	167	5.7	164	13.6
Plymouth Rocks, .	286	5.0	401	1.6	442	2.2	451	4.2	427	6.9	419	13.0
Anconas .	—	—	—	—	—	—	—	—	—	—	—	—
Houdans, .	16	8.5	14	5.2	14	4.8	13	6.8	12	10.7	12	15.8
Rhode Island Reds, .	165	6.3	209	4.1	223	5.0	328	6.3	339	8.7	345	15.5
Light Sussex, .	93	4.0	107	1.5	107	3.1	107	4.9	107	7.7	102	12.4
Red Sussex, .	43	4.3	43	3.1	42	0.4	42	2.7	42	6.5	41	11.5
Mixed Breeds, .	1,802	5.6	2,116	3.5	2,214	3.9	2,416	6.0	2,289	8.0	2,240	14.7
Totals, .	3,047	5.3	3,694	3.1	3,932	3.6	4,184	5.8	4,050	7.8	3,988	14.8

## SUMMARY TABLE SHOWING

Name of Breed.	December Quarter.	March Quarter.
White Leghorns, .	13.8	35.7
Minorcas, .	13.9	32.0
Buff Orpingtons, .	17.6	25.2
White Orpingtons, .	7.9	27.5
White Wyandottes, .	8.4	27.4
Faverolles, .	5.3	23.4
Plymouth Rocks, .	8.8	24.1
Anconas, .	—	—
Houdans, .	18.5	33.3
Rhode Island Reds, .	15.4	30.5
Light Sussex, .	8.6	25.0
Red Sussex, .	7.8	20.7
Mixed Breeds, .	13.0	28.7

YEAR 1914-15.

TABLE.

April.		May.		June.		July.		August.		September.		Total of Monthly Averages.
Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	
254	21.7	245	22.2	213	18.5	223	16.6	200	16.5	198	12.4	157.4
81	23.8	86	20.5	75	14.0	71	12.7	69	14.6	68	12.5	144.0
59	11.3	59	13.5	54	12.0	45	8.7	24	13.4	51	5.9	107.6
85	14.3	83	10.8	76	6.5	74	6.3	50	5.6	55	6.8	85.7
176	15.7	164	14.3	165	9.7	133	7.4	86	8.5	79	8.2	99.6
158	14.8	148	15.1	132	13.9	125	9.8	120	7.8	104	6.0	96.1
409	15.3	387	14.2	299	10.4	276	9.8	308	7.0	322	5.6	95.2
6	19.7	6	10.8	5	18.4	6	17.0	5	4.2	5	0.0	—
12	16.4	12	16.1	12	14.1	12	9.8	12	9.0	12	8.5	125.7
308	15.5	307	14.4	285	9.8	282	8.0	290	6.2	263	8.1	107.9
90	15.4	90	12.7	65	9.6	55	9.9	65	7.1	65	4.1	92.4
40	12.0	4	11.8	40	9.1	36	9.9	36	7.8	36	8.1	87.2
2,158	16.4	2,060	15.0	2,008	13.0	1,936	11.4	1,859	10.4	1,821	8.0	115.9
3,836	16.4	3,687	15.2	3,429	12.2	3,334	10.9	3,124	9.8	3,079	7.9	112.8

QUARTERLY AVERAGES, 1914-15.

June Quarter.	September Quarter.	Total for Year.
62.4	45.5	157.4
58.3	39.8	144.0
36.8	28.0	107.6
31.6	18.7	85.7
39.7	24.1	99.6
43.8	23.6	96.1
39.9	22.4	95.2
57.9	21.2	—
46.6	27.3	125.7
39.7	22.3	107.9
37.7	21.1	92.4
32.9	25.8	87.2
44.4	29.8	115.9

## WHITE LEGHORNS.

Number.	October.		November.		December.		January.		February.		March.	
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.
1	21	2.0	27	3.0	27	7.6	25	11.0	25	9.1	27	21.2
2	31	0.7	33	0.9	38	0.6	—	—	—	—	—	—
3	35	7.9	35	8.1	48	5.1	54	4.8	55	5.6	54	15.2
4	20	13.2	20	12.6	35	9.4	35	12.2	40	11.9	40	24.4
5	24	2.5	35	2.7	35	2.7	33	8.3	33	9.7	33	18.1
6	18	3.8	18	0.0	37	0.6	40	2.7	40	4.2	40	19.4
7	9	3.9	—	—	18	10.6	18	9.2	14	15.2	31	16.4
8	24	4.4	25	2.1	25	6.8	25	15.1	25	14.9	25	25.5
Totals,	182	4.8	193	4.1	263	4.9	230	8.2	232	8.0	250	19.5

## MINORCAS.

1	30	4.7	44	0.0	46	0.6	45	3.1	45	4.7	35	16.1
2	25	10.8	42	8.4	2	4.1	42	7.6	42	12.5	42	19.5
3	—	—	—	—	—	—	—	—	11	9.3	9	20.3
Totals,	55	7.5	86	4.1	88	2.3	87	5.2	98	8.6	86	18.2

## BUFF ORPINGTONS.

1	10	1.3	20	1.3	23	5.5	30	3.4	30	4.1	27	11.1
2	20	9.5	42	4.2	40	7.6	40	8.6	39	8.6	38	12.9
Totals,	30	7.4	62	3.3	63	6.9	70	6.4	69	6.6	65	12.2

## WHITE ORPINGTONS.

1	23	3.4	33	2.1	33	5.0	31	5.9	28	9.4	23	18.1
2	15	1.0	30	0.4	30	0.4	33	0.5	30	2.9	30	8.6
3	15	8.0	33	1.5	35	2.0	35	11.1	35	11.4	35	15.0
Totals,	53	4.0	96	1.4	98	2.5	99	5.9	93	8.0	88	13.6

## WHITE LEGHORNS.

April.		May.		June.		July.		August.		September.		Total of Monthly Average
Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	
27	19.9	27	21.1	27	19.1	27	17.6	31	14.6	30	13.1	159.3
—	—	—	—	—	—	—	—	—	—	—	—	—
53	21.1	50	22.7	43	18.5	34	18.6	33	18.5	33	17.5	163.6
40	25.4	38	22.3	30	17.0	30	19.7	30	13.5	20	18.0	199.6
33	20.3	33	22.1	33	17.9	33	16.3	33	16.8	33	8.5	145.9
44	20.8	40	21.4	34	20.4	34	15.9	27	17.4	27	9.4	136.0
32	19.3	32	22.5	21	15.9	30	19.2	21	17.9	30	11.7	—
25	25.6	25	23.5	25	19.6	35	9.7	25	17.5	25	9.2	173.9
254	21.7	245	22.2	213	18.5	223	16.6	200	16.5	198	12.4	157.4

## MINORCAS.

30	21.5	35	17.5	24	11.7	20	10.7	18	15.0	18	12.5	118.1
42	24.9	42	23.5	42	16.1	42	13.8	42	13.1	42	11.4	165.7
9	26.6	9	18.3	9	10.6	9	12.4	9	20.1	8	18.3	—
81	23.8	86	20.5	75	14.0	71	12.7	69	14.6	68	12.5	144.0

## BUFF ORPINGTONS.

24	13.6	24	10.3	24	9.3	20	2.0	—	—	—	—	—
35	9.7	35	15.7	30	14.2	25	14.2	24	13.4	51	5.9	124.5
59	11.3	59	13.5	54	12.0	45	8.7	24	13.4	51	5.9	107.6

## WHITE ORPINGTONS.

21	17.7	20	17.4	18	16.6	17	16.6	18	13.9	24	12.1	138.2
30	11.8	30	6.1	25	1.8	25	5.2	—	—	—	—	—
34	14.4	33	11.1	33	4.6	32	1.7	32	1.0	31	2.7	84.5
85	14.3	83	10.8	76	6.5	74	6.3	50	5.6	55	6.8	85.7

## WHITE WYANDOTTES.

	October.		November.		December.		January.		February.		March.	
Number.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.
1	20	8.2	34	0.9	34	0.4	34	2.1	34	5.4	36	14.7
2	31	3.5	28	5.5	32	0.1	32	7.7	32	8.4	34	14.6
3	28	3.3	26	3.0	44	3.3	41	5.7	44	13.0	44	15.3
4	29	2.0	28	1.1	30	2.8	32	9.0	32	9.3	30	14.6
5	33	3.9	33	0.1	33	0.0	33	0.4	33	3.3	32	15.3
Totals,	141	3.9	149	2.0	173	2.5	172	5.0	175	7.5	176	14.9

## FAVEROLLES.

1	22	0.0	30	0.7	30	3.4	30	3.4	30	3.6	30	14.3
2	13	2.6	18	0.0	22	0.0	18	1.8	17	1.8	14	13.7
3	13	6.9	24	2.4	24	3.8	23	4.8	23	7.4	23	12.1
4	40	1.1	40	0.0	33	1.0	40	2.9	40	6.6	40	14.6
5	35	2.1	30	0.9	30	0.5	30	4.6	30	6.3	30	11.2
6	9	16.2	9	0.0	—	—	—	—	—	—	—	—
7	34	0.8	36	0.8	37	2.1	—	—	—	—	—	—
8	15	3.8	31	2.9	29	1.4	28	7.0	27	7.1	27	15.4
Totals,	181	2.6	218	1.0	205	1.7	169	4.1	167	5.7	164	13.6

## PLYMOUTH ROCKS.

1	36	1.1	33	0.3	33	0.4	31	2.0	32	8.3	30	12.0
2	9	3.6	15	0.0	14	2.0	13	4.2	12	8.4	12	15.0
3	25	6.1	27	2.2	27	3.7	27	6.5	25	9.9	26	18.5
4	24	5.7	40	1.0	40	3.1	40	6.2	39	8.0	39	12.3
5	22	7.3	22	5.3	33	2.9	33	2.7	23	7.8	23	15.3
6	15	10.1	32	0.3	32	0.0	32	0.0	32	0.5	32	4.6
7	30	4.1	44	2.9	44	2.5	42	3.5	42	5.5	41	12.7
8	13	1.0	33	0.1	33	2.8	33	2.8	33	3.1	33	9.2
9	19	8.7	19	4.4	34	5.9	34	10.2	34	10.7	34	15.3
10	9	2.1	30	0.2	33	0.9	48	3.1	38	5.4	33	8.2
11	61	2.7	70	0.5	84	1.0	84	4.5	84	7.6	84	17.0
12	23	12.2	36	4.5	35	2.2	34	4.7	33	8.0	32	12.3
Totals,	286	5.0	401	1.6	442	2.2	451	4.2	427	6.9	419	13.0

## WHITE WYANDOTTES.

April.		May.		June.		July.		August.		September.		Total of Monthly Averages.
Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	
36	15.9	36	16.8	36	9.2	30	9.4	23	9.8	23	11.0	103.8
40	12.4	34	9.1	30	8.4	—	—	—	—	—	—	—
38	18.1	34	17.4	40	13.2	44	7.1	28	7.4	26	6.4	113.2
30	14.8	29	13.7	29	9.8	29	5.1	—	—	—	—	—
32	17.5	31	14.3	30	7.1	30	8.1	30	8.5	30	7.7	86.2
176	15.7	164	14.3	165	9.7	133	7.4	86	8.5	79	8.2	99.6

## FAVEROLLES.

30	16.1	30	19.8	30	16.3	30	11.2	30	11.6	30	9.5	109.9
15	14.0	14	16.1	15	13.8	15	6.8	9	3.8	13	0.0	74.4
23	14.3	23	10.2	20	8.5	20	3.3	20	4.9	20	4.8	83.4
40	14.2	40	11.6	27	14.9	27	5.4	27	3.4	27	5.2	80.9
30	13.4	26	17.0	25	13.2	20	18.6	24	11.6	14	7.4	106.8
—	—	—	—	—	—	—	—	—	—	—	—	—
20	17.0	15	17.9	15	15.5	13	15.8	10	7.6	—	—	—
158	14.8	148	15.1	132	13.9	125	9.8	120	7.8	104	6.0	96.1

## PLYMOUTH ROCKS.

30	13.2	29	11.6	26	15.8	23	6.4	23	3.3	23	5.1	79.5
12	13.9	12	10.8	11	10.4	9	9.1	12	5.0	7	0.0	82.4
24	20.0	19	20.6	19	11.6	25	11.6	24	9.1	24	10.2	130.0
39	16.3	38	14.8	—	—	—	—	—	—	—	—	—
23	15.3	23	12.3	22	11.5	22	9.0	22	8.0	21	5.2	102.6
32	14.4	32	8.2	32	5.3	32	7.2	32	6.3	32	4.6	61.5
37	11.6	39	9.7	34	13.8	24	14.0	34	8.9	41	6.4	95.6
31	14.0	29	17.1	25	8.2	25	3.0	25	0.8	25	0.0	62.1
34	16.1	34	15.8	18	15.3	18	13.7	18	12.2	18	11.9	140.2
33	11.2	32	15.4	27	9.1	27	10.5	25	6.4	25	1.4	73.9
84	18.1	72	18.7	60	12.9	48	16.0	70	9.3	83	6.3	114.6
30	15.0	28	9.7	25	4.2	23	1.9	23	2.5	23	6.7	83.9
409	15.3	387	14.2	299	10.4	276	9.8	308	7.0	322	5.6	95.2

## ANCONAS.

Number.	October.		November.		December.		January.		February.		March.	
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.
1	—	—	—	—	—	—	—	—	—	—	—	—

## HOUDANS.

1	16	8.5	14	5.2	14	4.8	13	6.8	12	10.7	12	15.8
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## RHODE ISLAND REDS.

1	33	1.0	33	2.7	33	7.3	33	8.1	33	10.8	32	18.7
2	17	7.3	32	5.3	32	3.6	29	5.4	32	12.2	32	16.2
3	16	10.1	24	6.6	24	7.1	26	11.4	25	11.9	25	17.4
4	28	12.8	42	4.4	52	6.2	42	11.7	40	12.6	40	17.2
5	20	9.7	20	3.5	26	1.7	29	3.0	29	4.3	29	11.7
6	15	2.2	22	0.5	22	0.0	21	3.9	21	7.9	20	12.6
7	—	—	—	—	—	—	30	8.4	21	12.4	30	14.3
8	6	0.0	6	0.0	4	0.0	8	3.0	7	3.9	7	15.4
9	30	4.3	30	6.1	30	7.6	30	7.5	30	8.7	30	17.3
10	—	—	—	—	—	—	80	2.4	80	4.0	80	11.6
11	—	—	—	—	—	—	—	—	21	11.2	20	25.7
Totals,	165	6.3	209	4.1	223	5.0	323	6.3	339	8.7	345	15.5

## LIGHT SUSSEX.

1	15	4.0	15	1.1	15	6.8	15	8.8	15	13.1	12	15.0
2	16	2.3	30	1.0	30	2.4	30	2.6	30	5.3	30	11.9
3	22	7.7	22	5.2	22	5.7	22	10.8	22	12.0	20	13.2
4	40	2.7	40	0.0	40	0.9	40	2.0	40	5.2	40	11.5
Totals,	93	4.0	107	1.5	107	3.1	107	4.9	107	7.7	102	12.4

## RED SUSSEX.

1	43	4.8	43	3.1	42	0.4	42	2.7	42	6.5	41	11.5
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## ANCONAS.

April.		May.		June.		July.		August.		September.		Total of Monthly Averages.
Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	
6	19.7	6	19.8	5	18.4	6	17.0	5	4.2	5	0.0	—

## HOUDANS.

12	16.4	12	16.1	12	14.1	12	9.8	12	9.0	12	8.5	125.7
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## RHODE ISLAND REDS.

32	15.2	32	5.5	30	16.5	30	12.6	28	11.0	23	13.5	132.9
32	15.9	32	16.6	2	3.0	44	0.0	44	2.1	34	2.6	90.1
24	17.9	23	14.4	23	13.1	20	16.5	19	12.5	17	10.8	149.7
40	15.2	38	14.8	38	11.3	32	15.1	46	9.8	46	10.4	141.5
29	13.0	29	12.4	28	7.4	28	5.1	28	0.0	19	11.3	83.1
20	16.8	20	141.8	15	11.1	15	8.1	20	5.0	20	6.0	88.9
—	—	—	—	—	—	—	—	—	—	—	—	—
7	13.3	6	19.2	4	16.3	3	17.7	4	10.7	—	—	—
30	20.0	30	14.7	20	16.9	20	11.3	15	13.2	20	11.2	133.8
79	11.5	79	11.5	79	6.9	74	4.4	70	2.0	69	2.9	—
15	27.9	18	21.3	16	8.0	16	11.5	16	13.2	15	21.1	—
308	15.5	307	14.4	285	9.8	282	8.0	290	6.2	263	8.1	107.9

## LIGHT SUSSEX.

—	—	—	—	—	—	—	—	—	—	—	—	—
30	13.7	30	9.4	25	8.3	20	7.1	30	4.6	30	4.9	73.5
20	13.8	20	14.8	—	—	—	—	—	—	—	—	—
40	17.5	40	14.1	40	10.4	35	11.4	35	9.3	35	3.4	88.4
90	15.4	90	12.7	65	9.6	55	9.9	65	7.1	65	4.1	92.4

## RED SUSSEX.

40	12.0	40	11.8	40	9.1	36	9.9	36	7.8	36	8.1	87.2
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## MIXED BREEDS.

Number.	October.		November.		December.		January.		February.		March.	
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.
1	20	6.4	50	3.3	90	1.8	90	3.3	70	5.0	70	12.2
2	50	3.7	70	1.2	62	2.6	55	6.7	55	7.1	54	13.7
3	39	0.4	46	5.6	43	7.7	49	6.9	47	9.1	40	23.3
4	22	2.0	18	1.5	18	0.4	32	2.0	30	2.3	30	11.4
5	34	7.0	46	5.0	45	5.2	40	7.2	40	7.1	40	18.6
6	30	5.5	60	2.1	55	1.9	60	5.7	60	7.7	60	13.3
7	60	7.2	64	3.3	64	2.9	59	6.8	58	11.4	57	18.3
8	70	2.3	70	3.6	122	2.7	122	2.9	—	—	—	—
9	24	8.8	39	2.0	35	2.3	35	0.0	38	2.9	45	10.4
10	54	10.0	58	2.6	60	2.1	60	5.1	60	9.0	60	18.5
11	38	7.4	49	4.4	49	5.7	46	9.3	47	6.5	47	18.0
12	40	2.2	40	5.7	53	7.7	52	9.4	50	6.7	56	13.6
13	49	3.7	47	0.6	47	0.8	42	1.1	47	2.6	47	6.0
14	50	6.9	50	4.2	50	1.2	50	3.7	61	3.0	60	18.5
15	39	9.4	63	3.1	53	1.6	43	4.4	43	6.8	42	13.5
16	47	3.9	49	0.1	51	0.9	70	0.9	70	3.8	70	9.4
17	35	3.1	66	1.0	69	0.3	72	1.4	73	4.7	73	13.4
18	29	7.4	29	4.1	28	3.5	31	7.0	35	9.8	36	15.4
19	70	8.6	70	8.4	75	6.4	75	5.8	75	8.8	75	14.7
20	30	8.3	30	0.4	30	0.6	31	3.3	32	6.3	40	4.7
21	18	6.6	29	4.5	23	5.7	23	6.7	24	10.6	24	20.7
22	9	2.2	20	0.9	20	3.9	31	3.1	31	4.2	30	12.1
23	24	5.6	24	2.7	24	3.0	24	5.5	24	9.0	25	20.4
24	28	4.5	26	2.8	29	3.6	29	5.4	30	6.0	28	11.5
25	73	5.7	80	2.7	93	3.4	93	6.2	85	8.3	80	16.0
26	75	1.3	95	0.7	90	2.2	91	4.6	85	6.2	87	10.7
27	23	6.0	29	0.9	36	1.1	34	4.2	31	4.3	—	—
28	50	5.2	50	2.8	50	7.1	60	6.7	50	11.2	50	13.4
29	35	3.0	31	3.1	37	4.6	38	4.7	38	7.1	37	13.8
30	50	4.8	50	3.6	60	4.6	70	7.9	60	13.4	50	19.9
31	35	9.7	34	8.8	32	7.0	33	10.8	36	11.2	33	23.9
32	81	5.3	82	3.0	86	3.6	101	4.9	106	6.4	111	13.9
33	14	3.2	14	2.5	13	7.0	13	7.3	13	2.8	6	6.5
34	49	5.7	90	2.1	76	4.1	75	7.9	89	8.1	85	14.6
35	41	9.4	39	7.5	38	8.8	40	12.8	37	14.8	34	20.6
36	14	0.6	34	0.0	34	0.0	30	0.0	28	3.6	40	8.5
37	50	4.8	50	4.4	50	5.4	55	9.8	55	11.9	59	15.3
38	28	4.3	31	3.9	34	4.8	39	3.2	33	6.7	34	12.7
39	20	3.7	25	1.7	20	2.0	20	3.4	20	4.2	20	10.7
40	27	2.3	36	1.7	36	3.0	36	1.6	36	3.3	36	13.8
41	90	6.4	90	6.9	90	6.5	90	9.4	90	12.7	90	20.9
42	15	4.9	16	1.8	28	2.0	25	8.6	25	7.2	24	14.4
43	60	13.1	50	11.8	40	9.5	46	12.8	60	9.6	45	10.6
44	13	6.0	24	5.9	26	11.5	26	8.2	25	11.0	24	17.2
45	50	5.6	50	1.9	50	9.6	50	9.5	62	9.9	61	12.1
46	—	—	—	—	—	—	130	11.3	125	11.8	125	17.9
47	—	—	—	—	—	—	—	—	—	—	—	—
Totals,	1,802	5.6	2,116	3.5	2,214	3.9	2,416	6.0	2,289	8.0	2,240	14.7

## MIXED BREEDS.

April.		May.		June.		July.		August.		September.		Total of Monthly Averages.
Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	
60	16.3	70	15.0	60	16.9	70	13.3	—	—	—	—	—
56	15.0	57	15.6	57	13.1	37	19.2	57	9.6	57	6.3	113.8
40	20.0	40	15.8	45	10.8	45	10.8	45	7.8	48	6.9	125.1
24	17.0	24	16.9	24	15.1	24	6.6	—	—	—	—	—
39	15.8	36	16.2	35	12.9	34	11.3	36	9.3	46	7.0	122.6
60	16.3	60	14.5	60	16.2	60	12.7	70	8.9	60	5.0	109.8
54	24.1	54	26.2	60	22.9	60	14.7	60	18.0	60	16.0	171.8
—	—	—	—	—	—	—	—	—	—	—	—	—
53	17.2	40	15.5	48	16.4	47	15.0	35	15.5	33	13.8	119.8
60	19.6	66	16.3	64	15.5	66	14.0	56	18.1	50	10.0	140.8
46	16.9	38	13.1	36	12.4	34	6.0	34	5.5	40	5.8	111.0
62	17.3	52	19.0	50	10.4	47	7.4	45	6.8	45	5.0	111.2
47	12.9	47	13.0	42	12.5	43	6.2	42	5.3	42	2.5	67.2
56	20.3	53	18.6	54	14.8	54	10.4	40	17.8	40	17.0	141.4
42	14.1	41	10.8	37	11.8	37	10.9	37	3.5	33	6.8	96.7
70	10.5	62	9.1	62	4.3	56	0.6	56	3.7	55	2.1	48.3
71	14.4	64	15.5	64	9.6	64	10.6	63	7.5	64	5.5	87.0
35	15.1	34	12.6	30	10.7	29	8.0	29	7.3	30	8.0	108.9
75	20.4	60	22.2	70	15.8	70	20.9	65	17.5	60	13.0	162.5
49	10.2	44	10.2	35	7.6	33	8.9	31	6.2	30	5.8	72.5
24	14.0	24	9.3	23	8.1	24	7.7	24	8.5	25	7.1	109.5
27	17.7	26	15.0	26	13.3	23	12.1	22	13.6	21	8.0	106.1
28	20.6	30	15.8	30	14.7	30	12.1	32	10.7	35	6.8	126.9
24	13.2	21	10.8	20	10.3	20	9.9	19	9.5	14	9.4	96.9
64	17.5	52	18.6	53	15.7	51	16.0	50	14.0	50	12.1	136.2
87	12.2	85	12.2	88	14.3	107	6.0	107	4.3	106	3.5	78.2
—	—	—	—	—	—	—	—	—	—	—	—	—
50	15.4	50	17.7	50	13.6	50	13.6	50	7.4	50	2.7	116.8
—	—	—	—	—	—	—	—	—	—	—	—	—
70	17.7	80	12.4	80	9.2	80	7.3	60	11.6	70	4.9	117.3
30	28.1	28	27.4	28	18.5	28	23.0	28	22.3	28	15.0	205.7
108	14.2	103	13.7	102	10.2	102	10.0	102	7.2	81	7.7	100.1
8	10.3	—	—	6	11.5	6	18.7	6	16.8	6	9.5	—
89	14.2	87	14.6	87	12.1	85	8.9	83	11.8	88	8.0	112.1
34	20.6	34	19.8	—	—	—	—	—	—	—	—	—
40	18.9	40	14.6	33	4.9	31	3.4	38	7.8	40	7.0	69.3
—	—	—	—	—	—	—	—	—	—	—	—	—
34	12.1	34	13.3	33	9.3	31	9.6	30	6.1	30	4.4	90.4
—	—	—	—	—	—	—	—	—	—	—	—	—
36	13.7	35	8.8	33	8.6	32	8.7	31	12.6	30	7.0	85.1
90	19.3	90	15.3	90	16.0	100	13.0	100	10.9	100	6.6	143.9
22	15.4	21	18.2	20	17.6	20	12.0	20	11.2	19	12.7	126.0
50	15.5	48	12.4	48	16.7	46	13.5	48	13.9	46	13.0	152.4
24	15.3	24	16.5	23	15.3	22	13.4	21	10.2	21	11.4	141.9
60	12.1	48	22.6	48	11.5	47	11.4	47	10.4	46	9.4	126.0
125	18.8	125	16.6	119	14.3	116	16.6	100	14.2	80	12.0	—
35	17.7	35	15.7	35	11.6	35	11.4	35	9.3	32	10.3	—
<hr/>												
2,158	16.4	2,060	15.0	2,008	13.0	1,996	11.4	1,859	10.4	1,821	8.0	115.9

## FEEDING PIGS ON GRASS LAND.

The practice of fattening off pigs on pasture during the summer and autumn months has long been common in the United States. Throughout the States in which indian corn is largely grown, known as the corn belt, the system is general of running pigs in the open pastures along with cattle that are being fattened off upon indian corn. These pigs, besides getting an allowance of grain feed daily, are utilised as scavengers to clean up any grain which the cattle have left untouched, as well as to consume any undigested portions of the whole grain which appear in the cattle droppings. In fact the quantity of the daily ration allowed such pigs, is regulated by the proportionate number of pigs and cattle being fed, and the form in which the grain is given, whether whole shelled corn or in a soaked or ground condition. Where the corn is given in the whole state, a larger undigested residue remains for consumption by the pigs, and a smaller daily grain allowance for these is required. Further, if an albuminous or protein food is fed to the cattle along with such a purely starchy food as indian corn is, it is found that cattle can digest the latter better and there is less of a residue available for pigs. Pigs fed in this way are put into pens about a month before the end of the fattening period, and are house-fed to finish. In other States pigs are fattened on different kinds of pasture, with an additional daily allowance of grain given. The result of experience has demonstrated to American feeders that pigs gain in weight at the lowest cost when allowed to graze and look for their own feed. It has been found, however, that pasture alone, whether this is composed of mixed grasses and clovers, or even lucerne, will not produce a satisfactory increase in weight, and needs to be supplemented by a half or even a full grain ration daily. Even if only half an average daily ration of grain is given, results show that pigs so fed will make a much more rapid gain in weight when afterwards housed and given a full daily allowance than if they had not been so treated. In consequence of the cheap and rapid gains made by pigs finished on summer pasturage supplemented by grain, there is a greater proportion of American pigs fattened off in the summer and early autumn months than during winter. In America, as in other countries, trials have shown that pigs require more food to put on the same weight in winter than in summer. Undoubtedly the reason for this is that a larger proportion of the food is necessary to maintain the bodily heat in winter, and less, in consequence, is available for the production of body fat.

The possibility of attempting this method of finishing pigs during

FEEDING PIGS ON GRASS LAND.

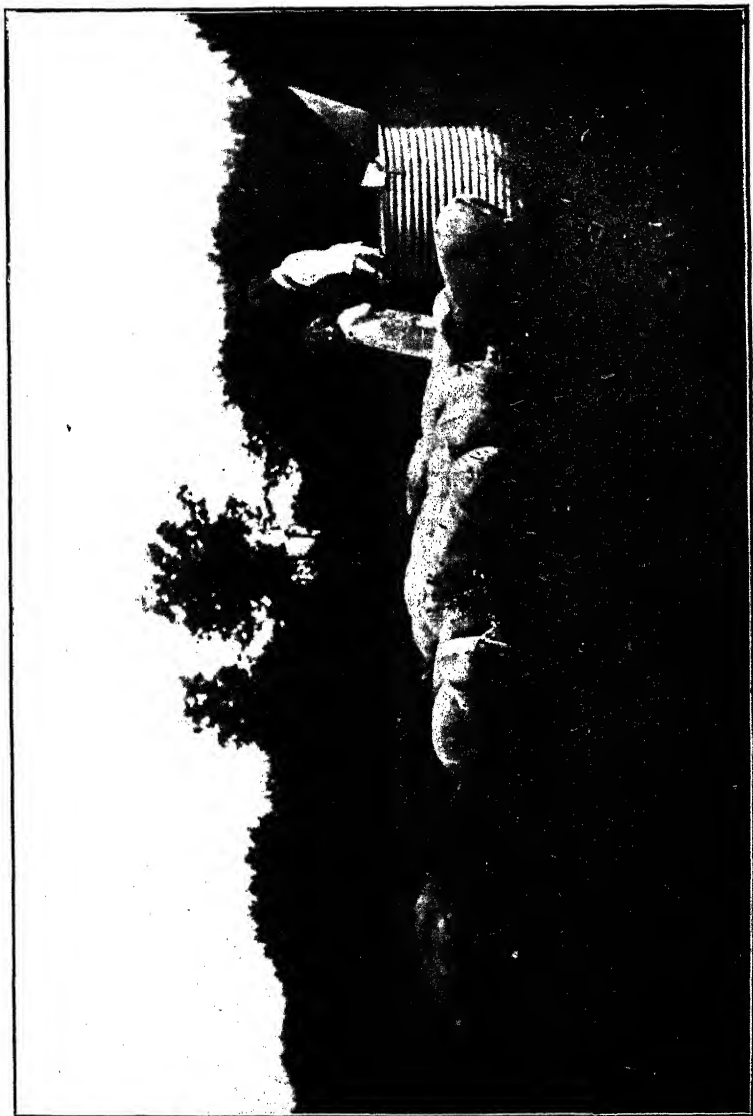


Fig. 1.—Grain Bin and Pigs feeding.

FEEDING PIGS ON GRASS LAND.

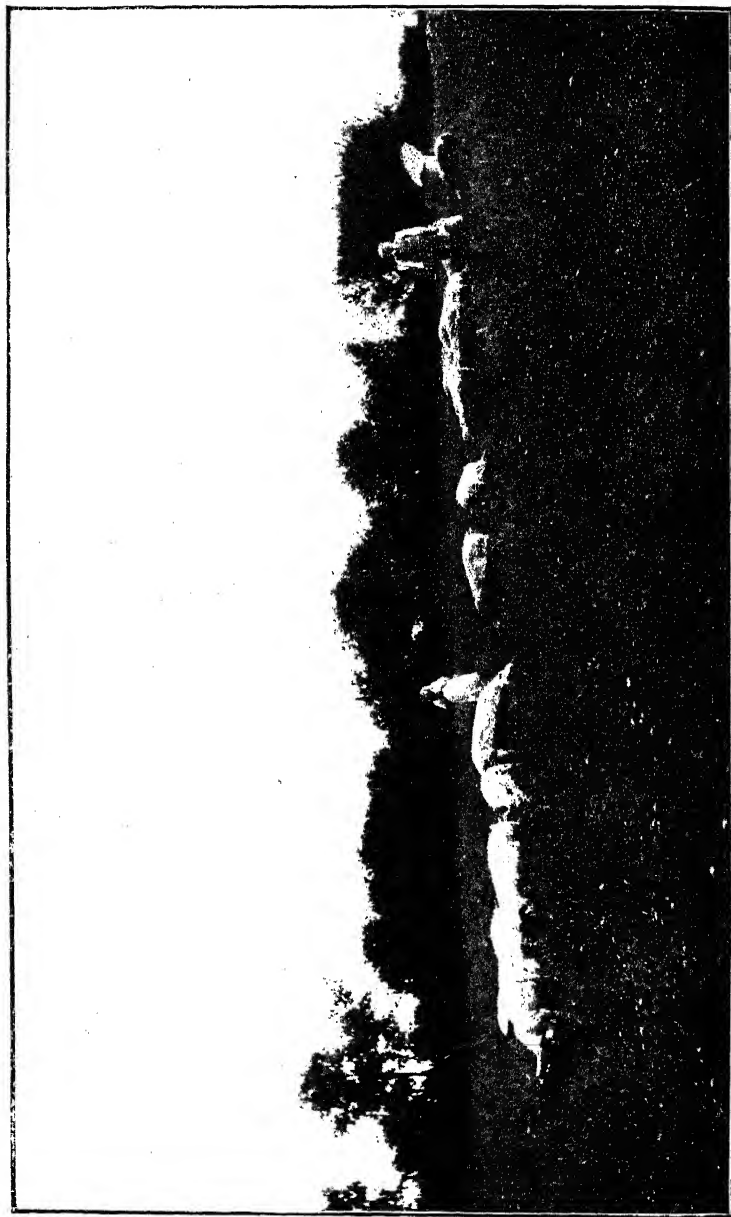


Fig. 2.—Pigs feeding on the grain scattered in a direct line.

the summer months does not appear to have attracted the attention of feeders in this country until the results of the trials carried out at Clonakilty Agricultural Station began to be known and pondered over. In an experiment designed to determine the amount of meal, or its equivalent, required to put on one lb. increase live weight, it was clearly proved that a greater increase for the amount of food given was obtained in the summer than in the winter months. "With 98 pigs fed from April to October, 3.91 lbs. of meal put on 1 lb. increase; whereas in 40 pigs fed from November to March, 4.23 lbs. were required; that is, 1 cwt of meal produced  $28\frac{1}{2}$  lbs. live weight increase in the summer fed lot, as against  $26\frac{1}{2}$  lbs. in the winter fed lot. The conclusion from this is that when pork is selling at 56s. per cwt. meal is worth 9d. per cwt. more for fattening pigs in summer than in winter."\*

Attracted, no doubt, by a desire to ascertain the possibility of fattening pigs on grass with an additional daily allowance of meal, a feeder in Co. Waterford the summer before last determined to carry out an experiment for his own information.

**An Irish Experiment.** His attention had been previously drawn to this system by the experience of some friends in one of the Northern counties, who, with the desire of enriching an orchard, devised the plan of enclosing pigs in it and feeding them on fine indian meal, given in addition to whatever grass was to be gathered. To their surprise the pigs made an unusually rapid gain in weight, and the experiment paid for itself satisfactorily. In the early summer of 1914 the feeder in Waterford purchased 54 store pigs averaging four to five months old. These cost from 28s. to 30s. each, the actual prices paid being 3 at 30s. each, 19 at 32s. each, and 32 at 28s. each. These pigs were put into a pasture field of ten acres (Irish), having been previously ringed to prevent rooting. One lot was started at the middle of May, and a second lot during the month of June. The supplementary daily food started with was  $\frac{3}{4}$  lb. per head of whole maize, which was increased to 1 lb. per head after the first fortnight. This was gradually raised in quantity as the pigs got heavier, until an allowance of 3 to 4 lbs. per head daily was being given: the pigs had access to water, and an open shed in the field provided shelter either by day time or at night according as the animals looked for it. The maize, which was fed whole, was stored in the field in two circular corrugated iron bins; this provision made its distribution by bucket on the ground convenient for the man employed to feed. The allowance of maize

\* See evidence of Mr. J. M. Adams, Principal, Agricultural Station, Clonakilty in Minutes of Evidence before the Departmental Committee on the Irish Pig Breeding Industry, page 15.

was given twice daily, and as the bins were of such a size as to be easily moved from one place to another, an even manuring of the field was secured. The maize was scattered on the ground usually in a direct line, and the pigs had no trouble in picking it up cleanly. As the pigs got near the desired weights they were drafted into feeding pens and finished off for the last month on a daily allowance of 6 to 8 pounds of a mixture of maize and pollard to which treacle water was added to make the meal sufficiently moist. As the pigs approached 2 cwt. (live weight), and calculated to kill approximately 1 cwt. 2 qrs. 14 lbs. (dead weight), they were sent off in batches to the nearest bacon factory. The first lot began to go about the middle of August, and they were all disposed of by the end of September. The total cost of the pigs, including the buying-in price, and the food consumed (maize and pollard £123 7s. 8d.), amounted to £209 16s. 10d. and the total receipts for the pork delivered at the factory amounted to £266 8s. 11d. If from this a bonus of £2 5s. 0d. allowed to the attending farm hand is deducted, a profit balance of £64 2s. 1d. is shown, or a profit of close on 25s. per pig during the feeding period. The pork when sold realised an average price of 60s. per cwt., and the manager of the local bacon factory in reporting on the quality of the pork fed on whole maize in the open stated it was the best that had been cured in the factory for the season.

Last year an experiment on exactly similar lines was tried on the same field. In all 51 pigs were fed, which were bought in at a total price of £88 19s. 0d. The cost of feeding stuffs, of which an accurate account was kept, amounted to £154 15s. 4d., and the sales of the 51 pigs when fat, which took place from August 10 to October 26, realised £317 6s. 2d., thus leaving a profit balance for the period of £73 11s. 10d., or an average return of £1 8s. 10d. for each pig fed.

<b>Advantages of the System.</b>	The feeder is convinced that the following advantages are obtained by the system which he considers might to great advantage be adopted on many farms during the summer months.
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- (1) The field grazed upon is benefited immensely by a rich and even manuring.
- (2) The pigs thrive better than if enclosed, for the reason that they are forced to thoroughly masticate the food in the form in which it is given, and the complete incorporation of the saliva with it enables them to digest it better.

- (3) The pigs are always in prime health owing to the natural exercise afforded: an occasional pig may be found attacked with skin lice, but an application of a dilute solution of Jeye's Fluid when noticed quickly remedies this.
- (4) The pigs when housed for finishing have generally good appetites and respond quickly to the heavier feeding given during the closing period of fattening.

Though it is possible that a pig of any age may be brought to a suitable killing weight more quickly by the ordinary system of house feeding than by the out feeding method above described, the reduced cost of the food required in the latter case and the saving in labour and attendance enables pork to be produced with a greater profit to the feeder.



## FLAX SEED FOR 1916 SOWING.

In view of the anticipated difficulties in procuring, during the period of the war, supplies of flax seed for sowing purposes, the Department decided, in September, 1914, to arrange for field trials of seed from various sources, including some from which seed had not previously been imported. Such tests were accordingly carried out in 1915.

At five centres the following varieties were grown:—Dutch, Riga, Dutch Child from Canada, Riga Child from France, and seed from Yorkshire. The results of these trials were as follows:—

AVERAGE RETURNS FROM FIVE CENTRES.

Variety of Seed	Dutch	Riga	Yorkshire	Canadian Dutch Child	French Riga Child
Average yield of Retted Straw per st. acre	2960 lb.	2990 lb.	2954 lb.	2862 lb.	2734 lb.
Average yield of Scutched Flax per st. acre	35 st. 9 lb.	32 st. 7 lb.	34 st. 13 lb.	32 st. 8 lb.	29 st. 11 lb.
Percentage of Scutched Flax from retted straw	16.85	15.21	16.55	15.93	15.25
Average value of Scutched Flax per stone*†	23s. 6½d.	23s. 9½d.	23s. 10d.	23s. 6½d.	23s. 8½d.
Average Return from Scutched Flax per st. acre	£42 4 2	£38 17 10	£41 15 10	£38 11 2	£35 9 10
Average Return from Tows per st. acre	£0 18 7	£1 2 10	£1 0 6	£0 18 9	£0 18 1
Average Return from Flax and Tows per st. acre	£43 2 9	£40 0 8	£42 16 4	£39 9 11	£36 7 11

\* The Flax grown on each plot at each centre was valued separately. These figures represent the average of the valuations.

† The Flaxes were valued on a basis of 25s. per stone for the best lot.

At five other centres the following were grown:—Dutch, Pernau Crown, Riga Child from Ireland, Pernau Child from Michigan, U.S.A., and an American seed—Minnesota 25, a strain of seed which, though originally improved by selection for seed production purposes, was thought would, owing to its remarkable evenness of growth, yield a satisfactory return of fibre. These trials resulted as follows:—

## AVERAGE RETURNS FROM FIVE CENTRES.

Variety of Seed	Dutch	Pernau Crown	Irish Riga Child	Minnesota 25	Michigan Pernau Child
Average yield of Retted Straw per st. acre . . .	3530 lb.	3474 lb.	3184 lb.	3482 lb.	2854 lb.
Average yield of Scutched Flax per st. acre . . .	37 st. 2 lb.	35 st. 4 lb.	30 st. 4 lb.	30 st. 8 lb.	23 st. 12 lb.
Percentage of Scutched Flax from retted straw	14.73	14.22	13.31	12.29	11.70
Average value of Scutched Flax per stone*† . . .	23s. 7d.	23s. 4½d.	23s. 3½d.	22s. 11½d.	23s. 4d.
Average Return from Scutched Flax per st. acre . . .	£43 15 0	£41 3 5	£35 6 0	£35 2 7	£27 18 9
Average Return from Tows per st. acre	£0 19 10	£1 2 3	£1 1 10	£1 2 1	£1 2 0
Average Return from Flax and Tows per st. acre . . .	£44 14 10	£42 5 8	£36 7 10	£36 4 8	£29 0 9

\* The Flax grown on each plot at each centre was valued separately. These figures represent the average of the valuations.

† The Flaxes were valued on a basis of 25s. per stone for the best lot.

Small plots of Japanese, Siberian, Canadian Common, and Argentine seed were also grown. The two former produced flax suitable for fibre purposes, but comparative scutching tests were impracticable because of the small quantity of straw available. The crop produced by Canadian Common—a variety usually grown for seed—was similar in character to that from Minnesota 25, though coarser and not so uniform in length. The Argentine seed produced, as was expected, short, branched plants quite unsuitable for fibre purposes.

These trials have demonstrated that seed of fibre varieties of flax suitable for Irish growers might be obtained from Yorkshire, Canada, France and the home-grown crops, as well as from Russia and Holland, whence the main supplies have hitherto come. Although the Minnesota 25 seed gave in the trials last season a remunerative crop of remarkably even flax, it should be observed that the plants were considerably shorter than those of the fibre varieties. Growers are for the present advised not to use this seed.

At the time of writing there would appear to be in the United Kingdom some 30,000 bags of seed which will be available for sowing in Ireland this year. This quantity would suffice for an acreage about equal to that under flax in this country last year. The enhanced price paid for scutched flax this season has induced

farmers to prepare for an increased acreage in 1916, and has thus stimulated a greater demand for seed than 30,000 bags will supply. The following notes are given for the guidance of farmers in the purchase of seed :—

1. *Dutch Seed*.—Considerable stocks of Dutch seed of 1915 growth have already been imported. The quality of bulk samples from these is good, as was to be expected in view of the fact that the Dutch crops were harvested under favourable weather conditions. It is still hoped that before the sowing season more seed will be obtained from Holland.

2. *Russian Seed*.—There are in Ireland several thousand bags of Riga seed of 1914 growth. This, if it has been properly stored, will be quite suitable for sowing next spring. It cannot, however, yet be definitely said whether the efforts of Belfast importers to obtain Riga seed of 1915 growth for this year's sowing will be successful.

3. *Yorkshire Seed*.—The total supply of good seed from this source is small—a few hundred bags. The weather experienced during harvest was unfavourable, but it is understood that some well-saved seed is available for export to Ireland.

4. *Canadian Seed*.—The seed used in the trials mentioned above was obtained from flax grown for fibre purposes in Ontario. The area under this variety of flax in Canada is relatively small, and seed from other parts of the Dominion, where linseed for crushing purposes is grown, would not suit the requirements of Irish growers. Several thousand bags of seed, reputed to be from 1915 Canadian fibre flax, have, however, been imported into Ireland by firms of high standing. Some of this seed has however when tested not germinated well, and though other parcels of Canadian seed do not in appearance compare favourably with Dutch seed, it must be borne in mind that the appearance of the seed alone is not a certain guide as to the crop it will produce. There is, moreover, in the country some Canadian Dutch Child of 1914 growth of the same stock from which the seed used in the Department's 1915 trials was obtained.

5. *French Seed*.—Some seed has already been imported from crops grown in Normandy which would, under ordinary conditions, have been sent to Courtrai for retting. This seed is from high-class fibre flax, and should not be confused with that from the Brittany crops, which would not suit Irish requirements.

Growers who have been accustomed to sow Riga seed need have

no hesitation about using Dutch if they cannot get the former. If neither of these varieties is available, growers may have recourse to Yorkshire, Canadian, or French seed, from crops grown for fibre purposes.

The testing of flax seed for germination and purity is more than ever necessary this season, when the demand for seed is greater than the supply of suitable and good seed. The resulting high price may lead to the placing on the market of seed which, though in appearance of good quality, is very inferior in germination. As has already been mentioned there are in the country stocks of seed of 1914 growth (i.e., yearling seed) from various sources. Such seed, if it has been properly stored and germinates well in spring, will be quite suitable for sowing: The Department have reason to believe that still older seed is in the country, and it is doubtful whether such would be satisfactory for sowing purposes. Unless special precautions are taken with home saved seed, its germination becomes impaired. For all these reasons the Department would urge that no flax seed be sown in 1916 before its germination has been ascertained. In case the germination is low, a braird of normal thickness may, of course, be secured by sowing a proportionately greater quantity of seed.

The Seed Testing Station for Ireland tests seed for farmers at a nominal charge of 3d. per sample. Flax seed should, if possible, be submitted not later than February or March, in special envelopes which are to be obtained free of charge and post free on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped.

*Copies of this article in leaflet form (No. 29 Revised) may be obtained free of charge and post free on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped.*

## ALLOTMENT GARDENING IN BELFAST.

By W. H. JOHNS, F.R.H.S., *Municipal Technical Institute, Belfast.*

The very general feeling, evoked by the war, that all practicable steps should be taken to increase the home production of food, has caused much interest to be taken in "allotments" or garden plots.

That allotment gardening can play a useful part in increasing food production is becoming recognised, and it is interesting to note that Lord Selborne, as President of the Board of Agriculture and Fisheries, has made an appeal urging the extension of allotments as a war measure.

In England, Scotland and Wales allotments have been established for a long time, and travellers by rail cannot fail to have noticed what a feature they are in the landscape near great cities such as London, Bristol, Manchester, Birmingham, Glasgow, etc. That there are so many is partly due to the fact that in Great Britain there is an "Allotments Act" (The Small Holdings and Allotments Act, 1908), which makes it incumbent upon the Local Authorities to provide ground for the purpose of allotments when a genuine demand has been made. This Act, however, does not apply to Ireland.

One of the first attempts to start allotments in Ireland was made by Mr. Charles Black, Solicitor, Belfast—son of the late Sir Samuel Black of Ireland. Mr. Black had been familiar for a long time with the movement in England, more particularly in the Manchester district. Accordingly, in 1907, he decided to try what could be done in Belfast. Having approached various landowners and agents without success, he at last managed to get a piece of ground in the Strandtown district. The ground obtained was a building site awaiting development. A provisional committee was formed, the ground fenced, and a number of workmen induced to take plots, each of about 400 square yards in area, at a subscription of 5s. per annum.

From this time onwards Mr. Black obtained more ground, mainly in the Strandtown area, until in 1912 there were about 400 plots either in working order or being marked out, comprising about 45 statute acres. The Belfast Christian Civic Union also became interested, and took a parcel of ground in the south end of the city, which was laid off into 21 plots, each 30 ft. by 90 ft., or 300 sq. yards. From this time up to the late summer of 1915

the development was comparatively slow, but, nevertheless, steady, some small extensions taking place in different localities—making a total of about 530 plots, covering about 50 acres of ground.

During the past four months there has been a remarkable extension of the movement, over 700 plots comprising

**Recent Extensions.** about 65 acres, in eight different groups, having been laid out. The largest of these groups is 29 acres in extent, and when in full working order will consist of 390 plots, each 30 ft. by 90 ft., about 250 of which have been let already.

The Belfast Corporation, as such, does not let out plots, but a portion of ground belonging to the Tramway department (formerly let for grazing) has been let to the Civic Union (at a slightly higher rental) for this purpose. While at the present time the Parks Committee are considering the advisability of letting certain uncultivated ground in the Parks for the same purpose.

It is confidently anticipated that in addition to the 1,200 plots already laid out, there will be another 500 added before the end of February, making a grand total of 1,700 plots, covering about 150 acres of ground.

The ground obtained for allotments has in the main been waste ground awaiting development for building purposes, consequently no security of tenure can be granted to the plot holders. The individual groups of plots vary much in the character of the soil; but, generally speaking, a large proportion have been formed on what might be considered as "Tom Tiddler's" ground, containing a good deal of cinders and other refuse. One piece in particular being so bad in this respect that the plot-holders were often to be seen (occasionally by moonlight), digging down to a depth of three to seven feet in order to bring the good soil up from below, and to bury the accumulated rubbish.

So keen were the plot-holders, that this ground, which had been regarded as impossible to cultivate, nearly won the Cup for the best group of plots in Belfast, in its first year of cultivation (1915).

The allotments vary in size from 30 ft. by 90 ft. (300 sq. yards), to 60 ft. by 60 ft. (400 sq. yards), and it occasionally happens that a plot-holder obtains two plots, one for his wife and the other for himself.

Rents, or subscriptions sufficient to cover the rents of the whole ground, are levied for each group of plots; thus

**Rents.** it happens that while most of the plots are let at 5s., a number are let at 6s., others at 7s. 6d. and about 100 are let at 10s. per annum.

The plots are rented by persons of various trades, occupations, and professions. In the main they consist of shipyard workers and other artisans and labourers, with a fair sprinkling of policemen who have obtained the necessary permission to become plot-holders.

The produce grown on the plots varies with the individual, but consists mainly of vegetables, including potatoes, the latter vegetable often preponderating. It seems strange that in Belfast, where potatoes can be bought so cheaply, that this should be the case, whereas near London the allotment-holders have a strong tendency to ignore the potato altogether; however, the plot-holders gradually learn to grow more of the choicer vegetables as time goes on.

It is not sufficiently realised, even by those familiar with the subject, how much produce can be, and is, grown on one of these small allotments. As a general rule, sufficient vegetables are grown on each plot to keep an average family of five persons supplied with green vegetables for the whole year, and of potatoes for about six months; this, for even 1,200 families, means an enormous amount of food, food produced on what would otherwise be waste land.

The value of the produce varies considerably in different districts, but as most of it—with the exception of seasonal surpluses, e.g., quick maturing crops, like cauliflowers and lettuces, etc.—is used for home consumption, the plot-holders generally value the vegetables at the price they would have to pay for them—the retail price.

Without going into details, I might say, that it is generally conceded that the prices of vegetables, including potatoes, is lower in those districts which have a large number of plots than in those districts in which there are none.

Generally speaking the standard of cultivation is fairly high, more especially when it is considered that most of the plot-holders were without previous experience or knowledge of gardening, although some few are gardeners, or have had a little farm experience in the country.

In the south end of the city prizes are offered for the best Flower Borders, and for the best Vegetable Plot, and this has helped to produce some really splendid results, which would do more than

ALLOTMENT GARDENING IN BELFAST.



Fig. 1.—Prize Border—Amateurs—grown by Mr. T. J. Hall (Mr. W. H. Johns, Instructor, appears in the photograph).



ALLOTMENT GARDENING IN BELFAST.



Fig. 2.—Prize Border—Gardeners—grown by Mr. W. R. Elliott (Mr. Calvert, the senior plot-holder, appears in the photograph).

credit to professional gardeners. It might be urged that at the present time plot-holders should not be encouraged to grow flowers, that while we are at war æsthetic values should not count. There may be a certain amount of reason in this view, but it has been found in actual practice that the adoption of a flower border (varying from 3 to 10 ft. wide) has not led to a diminution in the supply of vegetables. That those who have the best flower borders are also the ones who have the best vegetable crops—usually well arranged, both as regards successional, rotational and inter-cropping—has also been observed.

Such flowers not only brighten the homes of the workers, but many find their way to the hospitals, and during the past year wounded soldiers have on more than one occasion profusely thanked the plot-holders for such gifts. It would seem as if wounded soldiers appreciate flowers as much as most of the comforts they receive while in hospital and during convalescence.

During the past year even, a weed year if there ever was one, the plots have been fairly well kept, despite the fact that many of the holders have been working a considerable amount of overtime, while others have joined His Majesty's forces. In many cases the plots have been worked entirely by women, who, in some cases, are proving more than equal to the men.

As a result of allotments being established, various pieces of waste land which had a bad name are no longer in ill repute, while the quality of the soil has been greatly improved in consequence of deep cultivation and heavy manuring. As a consequence, landowners who formerly looked askance when approached for ground for this purpose, are now more ready to make concessions. There are, however, still some landowners and agents who refuse to allow land to be utilised for allotments.

Cases of improvement in the health habits and ideals of plot-holders are constantly being brought before one's notice. Many of the men testify to the benefit they have received by becoming plot-holders and thus finding a new interest in life, and something to do in their spare moments. Others, through being more in the open air and through getting more manual exercise, have been improved in health.

There seems to be a strong feeling of good-fellowship between the plot-holders, and very little of the produce is stolen, despite the fact that the fencing is not always of the best, and that the only barrier between neighbouring plots is a two-foot grass path. A higher civic spirit is developed in the individual and this cannot fail to have an influence for good on the whole locality.

The Belfast plot holders are not unduly hampered with restrictions. They are expected to grow six different kinds of vegetables, to set aside a portion for flowers, and to prevent the accumulation of weeds. They are not allowed to keep poultry on the plots, or to use the plots for drying or bleaching; dogs must be kept on leash when brought into the plots.

Since April of 1912, the Municipal Technical Institute, Belfast, has provided instruction in Horticulture for plot-holders and other persons. Demonstration plots have been set off in each main allotment area. In these plots different varieties of vegetables are grown, the effects of different manures shown, and at intervals demonstrations are arranged, when such subjects as Potato Spraying, etc., are dealt with. The general aim of such instruction has been to give the plot-holders a thoroughly practical training in vegetable cultivation—and also to get the plot-holders to experiment for themselves. The individual plots have also been visited regularly, and advice given concerning local difficulties, the plot-holders generally evincing a keen desire for this form of instruction. A monthly diary of garden operations has also been published during the past twelve months, and this seems to have been much appreciated. Courses of lectures in allotment gardening and general gardening have been held in the Technical Institute, while classes have also been arranged for gardeners, and for teachers who wish to qualify in Nature Study, Rural Economy, and in Rural Science, including School Gardening, while special lectures have been given on Window-box Gardening.

The Whitehouse Spinning Company have for some time had plots on their ground, comprising 20 plots of one-eighth of an acre. In Dublin the Vacant Land Cultivation Society has for a time had a number of plots under its control, and is at the present time making some extensions, while at Clonmel the Society of St. Vincent de Paul acquired in 1913 a field containing about 2½ Irish acres at a cost of just £500. The field was divided into twenty plots, and these, plus the rent of a cottage and of two hoardings, pay 5 per cent on the investment after providing for taxes, etc. There are also one or two other small schemes elsewhere in Ireland, and it would seem as if several attempts are to be made to establish allotments in places where there are none at present.

Much, however, remains to be done, and if all the waste ground in the neighbourhood of towns were cultivated—that unfit for cultivation could be utilised for poultry runs, etc.—by means of allotments, there would be a much greater increase in the food supply

ALLOTMENT GARDENING IN BELFAST.

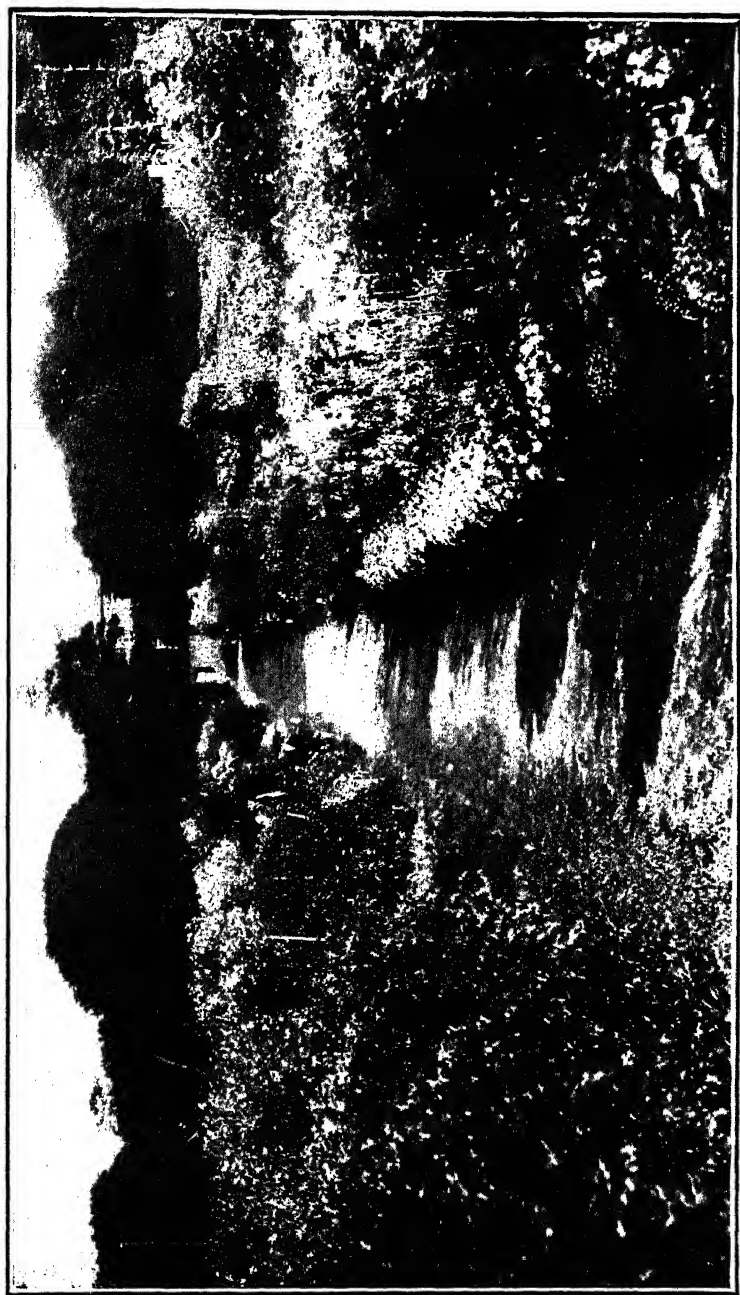


Fig. 3.—General view of plots, Upper Cadogan Park, Belfast, showing flower borders.



than is generally thought. Some of the ground at present used by farmers for vegetables, could be utilised for growing cereal crops, less vegetables would be imported, and consequently less would have to be paid for. Meat prices could be restrained by vegetable production. Peas, beans, leeks, beet, parsnips, onions, potatoes, etc., could be used as partial or even total substitutes; while if larger plots were to be given to the individual plot-holders and a proper scheme of organisation carried out, it should be possible to export vegetables to the densely populated portions of England.

However, there is no doubt whatever that a rapid extension of the movement all over Ireland, such as is taking place in Belfast, would be of immense national benefit not only now, but after the war.

The illustrations are from photographs by Baird, Belfast.

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### *An "Allotment" Diary.*

Appended is a copy of a Diary for the month of January issued to allotment-holders by the Horticultural Section of the Municipal Technical Institute, Belfast.

### NOTES ON DIARY.

*General Note.*—Get all digging and manuring operations completed as early as possible. Then lightly fork into the ground a dressing of Basic Slag, at the rate of 2 ozs. per square yard. This will help to improve the quality of the various crops.

*Seed Sowing.*—Make Sowings of Broad Beans and American Wonder Peas—towards the end of the month. These should give early crops.

*Planning of the Plot.*—Having made a sketch of the ground, with the positions which the various crops are to occupy, estimate the quantities of seeds, etc., which will be required, and obtain these early. The accompanying plan suggests one of the many ways in which the crops might be arranged. The figures indicate the space allotted for each individual row, the seeds or plants being placed in the middle of the space. The right hand columns indicate the amount of seed, etc., required, and also the crops which might very well succeed those taken away in the early summer. Where the plots are square it might be advisable to divide them into two, thus shortening the rows and making them more suitable for successional and rotational cropping, similar to sketch. In following years the groups of crops (bracketed together) would be transferred to the ground previously occupied by other groups.

## MUNICIPAL TECHNICAL INSTITUTE, BELFAST.

## HORTICULTURAL SECTION.

## THE MONTH OF JANUARY.

## SUGGESTED DIARY OF GARDEN WORK FOR PLOT HOLDERS.

North.

	PLAN OF PLOT Size, 90 feet x 30 feet.	Space for each row	Quantity of Seeds required	SUCCESSIONAL CROPS
Potatoes.	Edging of Parsley	6 inches	$\frac{1}{2}$ oz.	
	2 Rows Potatoes, "Midlothian Early"	2 feet 2 feet	$\frac{1}{2}$ stone	Savoy Cabbages.
	2 Rows Potatoes, "May Queen"	2 feet 2 feet	$\frac{1}{2}$ stone	Late Cauliflower.
	4 Rows Potatoes, "British Queen"	2 feet 2 feet 2 feet	1 $\frac{1}{2}$ stone	Curley Greens and Transplanted Leeks. also an early variety of Turnips, sown in July, for Winter use.
	6 Rows Potatoes, "Factor," "Glenview Seedling" or "Arran Chief"	2 feet 2 feet 2 feet 2 feet 2 feet	2 $\frac{1}{2}$ stone	Cabbages for Spring use
Cabbage Family.	1 Row Dwarf Peas, "Little Marvel"	3 feet	$\frac{1}{2}$ pint	Broccoli.
	4 Rows of Early Cabbages (Pamphrey)	2 feet 2 feet 2 feet 2 feet	100 plants	Potherb Celery, Leeks, etc.
	"Flower of Spring," "Ellam's Early," &c.			
	2 Rows of Cauliflowers, "Early London"	2 feet 2 feet	50 plants	Winter Lettuce.
	4 Rows of Brussels Sprouts, "Solidity"	2 feet 2 feet 2 feet 2 feet	100 plants	
Root and Miscellaneous Crops.	3 Rows of Drumhead Savoys	2 feet	70 plants	
	6 Red Cabbage Plants with these	2 feet 2 feet 2 feet	6 plants	
	1 Row of Tall Peas, "Alderman"	3 feet	$\frac{1}{2}$ pint	Broccoli.
	2 Rows of Carrots, "St. Valery"	1 foot 1 foot	$\frac{1}{2}$ oz.	
	2 Rows of Carrots, "Intermediate"	1 foot 1 foot	$\frac{1}{2}$ oz.	
	French Beans, "Canadian Wonder"	3 feet	$\frac{1}{2}$ pint	Broccoli.
	Turnip, "Early Snowball"	1ft. 6in.	$\frac{1}{2}$ oz.	
	Turnip, Garden Swede	1ft. 6in.	$\frac{1}{2}$ oz.	
	2 Rows Onions, "Ailsa Craig"	1ft. 6in. 1ft. 6in.	$\frac{1}{2}$ oz.	
	2 Rows Parsnips, "Student"	1ft. 6in. 1ft. 6in.	$\frac{1}{2}$ oz.	
	2 Rows Beet	1ft. 6in. 1ft. 6in.	1 oz.	
	(Celery Ridge) Radish	1ft. 6in.	$\frac{1}{2}$ oz.	
	Trench of Celery (double row)	1ft. 6in.	60 plants	
	(Celery Ridge) Lettuce	1ft. 6in.	$\frac{1}{2}$ oz.	
	Seed Bed for Cabbages, Leeks, Celery, Scallions, &c.	3 feet	$\frac{1}{2}$ oz. each of different varieties.	
	Flower Border	3 feet		

N.B.—Copies of this Diary can be obtained by Plot Holders on application to the Office  
Municipal Technical Institute, Belfast.

## OFFICIAL DOCUMENTS.

### I.—AGRICULTURE.

## ORDER.

### OF THE DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

(Dated 10th January, 1916.)

### BLACK SCAB IN POTATOES (SPECIAL AREA, IRELAND) ORDER, 1916.

The Department of Agriculture and Technical Instruction for Ireland, by virtue and in exercise of the powers vested in them under the Destructive Insects and Pests Acts, 1877 and 1907, do order and it is hereby ordered as follows:—

#### ALTERATION OF PROHIBITED AREAS.

I. From and after the 10th day of January, 1916, the Black Scab in Potatoes (Special Area, Ireland) Order, 1915, shall be read as if the areas described in the Second Schedule to that Order were the areas described in the Schedule to this Order.

#### SHORT TITLE.

II. This Order may be cited as the Black Scab in Potatoes (Special Area, Ireland) Order, 1916.

In witness whereof the Department of Agriculture and Technical Instruction for Ireland have hereunto set their Official Seal this Tenth day of January, Nineteen Hundred and Sixteen.

J. V. COYLE,

(L.S.)

*On behalf of the Secretary.*

## SCHEDULE.

### PROHIBITED AREAS.

1. A District comprising:—

Such parts of the Administrative County of Down as lie within the following boundary (the roads mentioned as forming the boundary being regarded as outside the prohibited area):—

Commencing at the point on the coast in the townland of Benagh Upper, in the Barony of Mourne, where the White Water river enters Millbay, thence by the White Water river to Lower White Water bridge, thence by direct road to Ballyardel cross-roads, thence by the direct road *via* Bellhill to Newry main road, thence by the direct road to Mr. Doran's shop, thence by the direct road



via Massfort Chapel to Hilltown Mountain road, thence by the direct road to the point where it meets the townland boundary between Kilkeel and Aughnaloopy townlands, thence by the townland boundary via Pookey bridge to the Kilkeel river, thence by the Kilkeel river to the Newcastle road bridge at Riverside, thence by the direct road to Mullagh bridge, thence by the Mullagh river to Brackenagh bridge, thence by the direct road to Ballyveagh Beg main road, thence by Ballyveagh Beg main road to Brackenagh cross road, thence by the direct road over ford and townland boundary to Ballyveagh cross roads (near Ballyveagh school), thence by Longstone road, passing Moneydorrugh school, to Mr. McKibbin's house, thence by Moneydorrugh Beg road (known also as Rocky Hill road), passing Mr. Stewart's shop, to Newcastle road, thence by the direct road to Moneydorrugh Beg Shore road, thence by Moneydorrugh Beg Shore road to the point where it reaches the seashore, thence directly by the seashore via Greencastle Point to the point on the coast in the townland of Benagh Upper, in the Barony of Mourne, where the White Water river enters Millbay.

2. Any farm, garden, cottage plot or agricultural holding (situated wholly or partly within the area described as District No. 2 in the First Schedule to the Black Scab in Potatoes (Special Area, Ireland) Order, 1915) on any portion of which the disease of potatoes known as Black Scab, Wart or Warty disease, Cauliflower disease, Potato Canker or Potato Rosette (and caused by the fungus known as *Chrysophlyctis endobiotica* [Schilb] or *Synchytrium endobioticum* [Perc.]) exists or has at any time existed.

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A. B. MEMO. No. 4.

## DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

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It is illegal for a merchant to sell a manure without giving an invoice on which is stated clearly the percentages (if any) of nitrogen, soluble phosphates, insoluble phosphates and potash. Farmers have no protection against worthless or adulterated manures if they do not get such an invoice.

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### ARTIFICIAL MANURES, 1916.

There is every likelihood that artificial manures will be scarce as well as dear. It is to the farmer's interest, therefore, to set about collecting as much farmyard manure as possible, and particularly to take steps to store it carefully and to collect the liquid manure, which contains the greater part of the nitrogen and potash of the food consumed by stock. Liquid manure as ordinarily diluted is weight for weight equal to solid farmyard manure, and first-rate crops of grass and roots can be grown with it when supplemented by superphosphate or basic slag.

There is more land than usual to be manured in 1916. The scarcity of artificials will, therefore, be felt the more. The Depart-

ment are of opinion that farmers would be well advised to lay in supplies at once, especially supplies of phosphates for topdressing grass land. For this purpose the manure cannot be applied too early. Later on in the season transport difficulties may cause disappointment and prevent prompt delivery.

Owing to the high prices of manures, farmers are warned to be specially careful this year in purchasing. In the past there have been manures offered of very inferior quality at comparatively high prices. This year the temptation to put such articles on the market is intensified owing to the scarcity and dearness of the genuine article. No farmer, however, need have any doubts or run any risks if he will be advised to shun all compounds and special mixtures and purchase nothing but what the Department recommend. These are the best and cheapest manures to be had. They can be purchased from all merchants and from agents, if the farmer insists on getting them. The farmer who accepts this advice and acts upon it regardless of all persuasion to the contrary will get the best value for his money.

The following observations require special attention. Of the three constituents of manures, viz., potash, nitrogen, and phosphate, the first named is not available except at prohibitive prices. Fortunately it is the least important of the three from the point of view of heavy crop production, except for potatoes and flax. Of the other two, nitrogen can most easily be spared, provided the farmer will collect as much farmyard manure, solid and liquid, as possible. Without farmyard manure good crops of potatoes, cabbages, and mangels cannot be grown unless on exceptional soils where a complete mixture of artificials is used. These crops, therefore, must get a fair share of the dung and liquid manure available. The remainder of the dung and liquid manure, for swedes and turnips, should be distributed over the entire area which is to be devoted to these crops. Good crops of roots can be raised with a moderate quantity of farmyard manure supplemented by superphosphate or basic slag.

The nitrogenous manures which the Department recommend are sulphate of ammonia, nitrate of soda, nitrate of lime and calcium cyanimide (nitrolim). Sulphate of ammonia is available, but at the present price (about £17 per ton on rail) the Department cannot recommend its liberal use except for potatoes and grain crops.

Nitrate of soda, a manure which is excellent for most crops and especially for hay, mangels and cabbages, has reached such a price (£15 per ton) as to necessitate its restricted use.

Of the other two nitrogenous manures, which are of comparatively recent introduction, viz., nitrate of lime and nitrolim, no supplies are available.

To compare the value of the two available nitrogenous manures divide the price per ton of—

Sulphate of ammonia by	19½.
Nitrate of soda by	15½.

This will give the unit price of nitrogen in each. As a general rule farmers should then buy the cheaper, but it will pay to give a little extra for nitrate of soda as a dressing for hay, mangels and cabbages.

Of the three manures above mentioned phosphate is the most important, especially when, as is usually the case, artificial manures

are used to supplement dung or liquid manure. It forms the basis of all good mixtures. In ordinary circumstances high grade superphosphates should be purchased. To compare the values of superphosphates of different qualities, divide the price per ton by the percentage of soluble phosphates it contains and take the cheapest, stipulating, however, that it must be in good condition. There is nothing more wasteful than the application of manures which are damp and cannot be uniformly distributed.

The present price of 35 per cent. superphosphate at Dublin and Belfast is £4 7s. 6d. per ton, or 2s. 6d. per unit.

As the supply of superphosphate is this year likely to be short, the Department recommend farmers, if they cannot get sufficient for their requirements, to use a mixture of two parts 35 per cent. superphosphate and one part mineral phosphate. Farmers should get a guarantee that the mineral phosphate is North African (Tunisian or Algerian). This guarantee manufacturers are prepared to give on their invoices. In previous years the Department have not recommended the use of mineral or raw phosphates and they do so now solely because of the probable scarcity of superphosphate.

Basic slag is also scarce and dear. It can be used for all crops, and is specially suited for swedes, turnips, and pasture. It should not, however, be mixed with sulphate of ammonia. If the unit price of citric soluble phosphates in basic slag is less than that of soluble phosphates in superphosphate, buy the slag.

Great care should be taken in buying low grade slags and those with which no guarantee of percentage of soluble phosphates (Wagner's method) is given. No low grade slag should be purchased without consulting the Agricultural Instructor. It should be made quite clear that so long as superphosphate or basic slag can be purchased at reasonable prices mineral phosphate should not be used.

The following unit values, based on prices at present quoted, free on rail at Dublin and Belfast, are issued for use in comparing the commercial values of manures offered to farmers during the forthcoming season. These figures may need revision, as prices are in these times liable to change:—

Nitrogen	..	..	17s. 6d.	per unit.
Phosphates soluble in water	..	..	2s. 6d.	..
Phosphates soluble in citric acid	..	..	1s. 9d.	..
Insoluble mineral phosphates	..	..	1s. 6d.	..
Phosphates in basic slag soluble in citric acid	..	..	2s. 6d.	..

No unit price is fixed for potash, as salts containing this fertiliser are no longer available at reasonable prices.

Supposing a manure offered is stated to contain 3 per cent. nitrogen, 16 per cent. soluble phosphate, 4 per cent. phosphate soluble in citric acid, and 3 per cent. insoluble mineral phosphate. Its value may be estimated by multiplying the percentage of each ingredient by the unit value given above. Thus:—

Nitrogen	..	..	3% at 17s. 6d.	..	£2 12 6
Soluble phosphate	..	..	16% „ 2s. 6d.	..	2 0 0
Citrate soluble phosphate	..	..	4% „ 1s. 9d.	..	0 7 0
Insoluble phosphate	..	..	3% „ 1s. 6d.	..	0 4 6

Total price, ton .. £5 4 0

Even though prices vary from time to time, the scale of unit prices will enable the buyer to ascertain which of a number of manures offered is the best value. But if farmers consult their own interests they will ask for superphosphate, basic slag, and the cheaper of the nitrogenous manures referred to above.

A limited quantity of genuine guano has been imported. Farmers, however, should be on their guard lest they are offered a spurious article. The advice of the Agricultural Instructor should be sought before purchasing guano.

The following kinds and quantities of manures are recommended, per statute acre for each crop :—

#### MANGELS.

##### With Dung.

- 1 to 2 cwt. sulphate of ammonia,
- 4 cwt. superphosphate, 35%,
- 4 cwt. salt,
- applied in the drills ;
- or
- 4 cwt. superphosphate, 35%,
- 4 cwt. salt,
- applied in the drills, and
- 1 to 2 cwt. nitrate of soda,
- applied after thinning.

#### TURNIPS AND SWEDES.

##### With Dung.

- 4 to 6 cwt. superphosphate, 35%,
- or
- 4 to 6 cwt. basic slag,
- both applied in the drills.

##### Without Dung.

- 1 cwt. sulphate of ammonia,
- 4 to 6 cwt. superphosphate, 35%,
- or
- 1 cwt. nitrate of soda,
- 4 to 6 cwt. basic slag,
- both applied in the drills.

#### OATS OR BARLEY.

- 1 cwt. sulphate of ammonia,
- 3 cwt. superphosphate, 35%,
- applied before sowing seed.

#### WHEAT.

- 1 cwt. nitrate of soda,
- applied in March or April ;
- or
- 1 cwt. sulphate of ammonia,
- applied in February or March.

## HAY.

1 cwt. nitrate of soda,  
3 cwt. superphosphate, 35%  
since nitrate of soda and superphosphate  
should not be mixed, apply the superphos-  
phate in March and the nitrate of soda in  
April;

or

1 cwt. sulphate of ammonia,  
3 cwt. superphosphate,  
applied in March.

## PASTURE.

5 cwt. basic slag;  
or  
5 cwt. superphosphate, 35%,  
applied in January or February.

## POTATOES.

1 cwt. sulphate of ammonia,  
4 cwt. superphosphate, 35%,  
applied in the drills.

In all these mixtures, if superphosphate is scarce, use instead a mixture of two parts superphosphate to one part Tunisian or Algerian mineral phosphate.

Appended is a statement showing the amount which is to be added to the price of manures in Dublin or Belfast to represent the cost of the same manure at various railway stations in Ireland.

**STATEMENT showing the amount which must be added to the Price of Manures in Dublin or Belfast to represent the cost of the same Manures at the following places when purchased from a local merchant or in quantity direct from the manufacturers :—**

(The figures in the following Table are believed to be substantially accurate, but the Department accept no responsibility for any inaccuracies due to alterations in railway or canal rates or other causes.)

A.		Per Ton.			Per Ton.	B.		Per Ton.
Abbeydorney	..	12/9	Ardcollus	..	12/3	Bagnalstown	..	8/3
Abbeyfeale	..	13/-	Arigna	..	11/9	Balbriggan	..	4/3
Abbeyleix	..	8/-	Arklow	..	6/3	Balla	..	13/6
Achill	..	14/-	Armagh	..	5/9	Ballaghaderreen	..	13/-
Adare	..	10/6	Armoy	..	9/3	Ballina	..	10/-
Adoon	..	11/9	Arva Road	..	10/3	Ballinahinch	..	12/-
Aghada	..	5/3	Askeaton	..	11/3	(Co. Galway).		
Aghadowey	..	9/-	Athboy	..	6/6	Ballinamallard	..	10/-
Aghalee	..	3/9	Athenry	..	8/-	Ballinamore	..	11/9
Aldergrove	..	4/6	Athlone	..	6/6	Ballinamore	..	10/3
Annaghmore	..	5/6	Athy	..	5/9	(Donegal).		
Antrim	..	4/-	Attanagh	..	8/6	Ballinascarty	..	7/9
Ardagh	..	11/6	Attymon	..	9/3	Ballinasloe	..	8/9
Ardara Road	..	12/9	Augher	..	8/6	Ballinass	..	10/-
Ardee	..	6/-	Aughnacloy	..	8/3	Ballinacollig	..	4/6
Ardfert	..	12/3	Aughrim (Wicklow)	..	6/9	Ballinderry	..	3/9
Ardglass	..	5/6	Auniscaul	..	14/3	Ballindine	..	11/6
Ardrahan	..	9/9	Aylwardstown	..	6/3	Ballindrait	..	6/3

These amounts, which in the majority of cases are not the actual rates of carriage per ton from Dublin or Belfast, are arrived at by ascertaining the difference between the cost price of one ton of manure free on rail at Dublin or Belfast and the cost of a ton of manure of the same quality imported at the nearest or cheapest port and adding to that difference the cost of conveyance per ton from that port to the buyer's station.

	Per Ton.		Per Ton.		Per Ton.
Ballineen ..	7/9	Bective ..	5/9	Castleblayney ..	9/-
Ballinglen ..	6/9	Belcoo ..	13/-	Castlecaldwell ..	11/-
Ballingrane ..	11/-	Bellarena ..	6/6	Castleconnell ..	11/6
Ballinhassig ..	4/6	Belleek ..	11/3	Castledawson ..	6/9
Ballinlough ..	12/6	Bellurgan ..	7/9	Castlederg ..	8/9
Ballinrobe ..	12/-	Belmont ..	6/3	Castlefin ..	6/9
Ballintra ..	11/9	Belmullet ..	12/6	Castlegregory ..	13/9
Ballybay ..	9/6	Belturbet ..	9/6	Castlegregory Junc.	12/9
Ballybeg ..	5/9	Bennett's Bridge ..	8/6	Castlegrove ..	10/6
Ballybofey ..	7/9	Beragh ..	8/3	Castleisland ..	12/3
(Stranorlar).		Bessbrook ..	7/-	Castlemaine ..	12/3
Ballyboley ..	6/3	Birdhill ..	11/9	Castlereagh ..	11/6
Ballybrophy ..	6/6	Blackrock (Cork) ..	4/6	Castlerock ..	7/6
Ballybunion ..	12/6	Blackwatertown ..	5/9	Castletown ..	8/3
Ballycar ..	12/-	Blarney ..	4/3	Castletownberehaven	10/9
Ballycarry ..	4/3	Blessington ..	4/-	Castletownroche ..	7/6
Ballycastle ..	8/9	Boher ..	11/3	Castlewellan ..	5/6
(Antrim)		Borris ..	8/9	Cavan ..	9/6
Ballyclare ..	2/6	Boyle ..	11/6	Celbridge ..	3/-
Ballyclare Junc.	3/-	Bray ..	2/9	Chapel ..	7/6
Ballyconnell ..	10/3	Bridge End ..	4/9	Charlemont ..	5/6
Ballycullane ..	7/3	Bridgetown (Wexford)	8/9	Charlestown ..	13/3
Ballycumber ..	7/9	Brittas ..	3/-	Charleville ..	8/3
Ballydehob ..	10/6	Brookeboro' ..	9/9	Church Cross ..	11/6
Ballyduff (Cork)	8/-	Brookmount ..	3/-	Church Hill ..	7/9
Ballygawley ..	8/3	Bruckless ..	11/-	Clady ..	6/3
Ballyglunin ..	9/-	Bruree ..	9/-	Clara ..	7/6
Ballygowan ..	2/6	Bunbeg ..	10/-	Clare Castle ..	11/3
Ballyhack ..	6/6	Buncrana ..	7/-	Claremorris ..	11/3
Ballyhaise ..	9/3	Bundoran ..	11/6	Clashganny ..	7/9
Ballyhale ..	7/6	Bundoran Junc.	10/-	Clifden ..	11/6
Ballyhaunis ..	12/6	Burnfoot ..	5/-	Cloghan ..	9/3
Ballyhooley ..	7/9	Burton Port ..	10/3	Clogher ..	9/-
Ballyliffin ..	7/9	Bush ..	7/9	Cloghroe ..	4/6
Ballylongford ..	12/6	Buttevant ..	7/6	Clonakilty ..	7/6
Ballymagan ..	6/6			Clonakilty Junc.	7/-
Ballymagorry ..	5/3			Clondulane ..	7/3
Ballymartle ..	5/6	C.		Clones ..	8/6
Ballymena ..	5/6	Cahir ..	9/9	Clonmany ..	7/-
Ballymoe ..	11/6	Cahiriveen ..	12/6	Clonmel ..	7/3
Ballymoney ..	7/9	Caledon and Tynan	6/9	Clonsilla ..	2/-
Ballymore ..	4/-	Camolin ..	7/6	Cloughjordan ..	8/3
Ballymote ..	12/3	Campile ..	6/-	Coachford ..	5/6
Ballynahinch ..	4/3	Capecastle ..	10/6	Coachford Junc.	4/6
(Co. Down).		Cappagh ..	9/6	Coagh ..	7/9
Ballynahinch Junc.	3/3	Cappoquin ..	8/9	(via Monseymore).	
(Co. Down).		Caragh Lake ..	13/-	Coalisland ..	5/-
Ballynashee ..	6/9	Carberry ..	6/6	Colbinstown ..	5/9
Ballynoe ..	5/6	Cargan ..	10/-	Colebrook ..	9/9
Ballynure ..	6/-	Carlingford ..	7/9	Coleraine ..	6/3
Ballyragget ..	8/9	Carlow ..	7/3	Collooney ..	9/3
Ballyrone ..	5/9	Carndonagh ..	8/3	Comber ..	2/3
Ballyshannon ..	11/3	Carrickfergus ..	2/6	Convoy ..	7/-
Ballysodare ..	9/3	Carriehue ..	5/3	Cookstown ..	7/9
Ballyvary ..	13/6	Carrickmacross ..	8/-	Cookstown Junc.	5/-
Ballyward ..	5/9	Carrickmore ..	7/9	Cooteshill ..	10/3
Ballywillan ..	9/6	Carrick-on-Shannon	9/3	Corbally ..	4/-
Ballywilliam ..	7/-	Carrick-on-Suir ..	7/3	Corbet ..	5/3
Baltimore ..	10/9	Carrigaholt ..	12/6	Cork ..	2/6
Baltinglass ..	6/3	Carrigaline ..	5/3	Corkin ..	13/-
Banagher ..	7/6	Carrigaloe ..	5/3	Courtmacsherry ..	7/6
Banbridge ..	4/6	Carrigans ..	5/3	Courtwood ..	5/6
Bandon ..	6/6	Carrigrohane ..	4/3	Craigavon ..	2/3
Bangor (Down)	2/3	Carrigtwohill ..	5/3	Cratloe ..	11/6
Bansha ..	10/9	Carroll's Cross ..	6/9	Craughwell ..	9/3
Banteer ..	8/-	Carrowen ..	5/6	Creeslough ..	10/-
Bantry ..	9/9	Carrowmore ..	11/3	Craighanroe ..	7/6
Barnagh ..	12/3	Cashel ..	11/-	Crew ..	8/3
Batterstown ..	3/9	Cashelnagore ..	10/3	Croly ..	10/3
Bawnboy ..	11/9	Castlebar ..	12/9	Crookstown Road ..	5/6
Beauparo ..	5/6	Castlebellingham ..	6/6	Croom ..	9/9

	Per Ton.		Per Ton		Per Ton.
Crossdoney ..	10/-	Durrow ..	8/3	Greenore ..	7/6
Crossgar ..	4/3	Durrus Road ..	10/-	Greystones ..	4/3
Crosshaven ..	5/9		E.	Groomsport ..	3/-
Crossroads ..	8/-	Edenderry ..	4/3	Gweedore ..	10/3
Crumlin ..	4/3	Edermine Ferry ..	7/6		H.
Crusheen ..	13/3	Edgeworthstown ..	9/-	Hamilton's Bawn ..	6/6
Cullion ..	4/6	Eglinton ..	4/6	Harristown ..	4/6
Culloville ..	8/3	Embankment ..	1/9	Haulbowline ..	6/3
Cullybackey ..	6/3	Emly ..	9/9	Hazelhatch ..	3/-
Culmore ..	2/6	Emyvale Road ..	7/9	Headford Junc. ..	10/-
Curry ..	12/9	Enfield ..	5/6	Healy's Bridge ..	4/3
	D.	Ennis ..	11/3	Helen's Bay ..	2/6
Dalkey ..	3/6	Enniscorthy ..	6/3	Hilden Siding ..	2/-
Derryork ..	7/3	Enniskillen ..	10/-	Hill of Down ..	6/6
Dervock ..	9/9	Ennistymon ..	15/3	Hillsborough ..	3/3
Desert ..	7/6		F.	Hollyhill ..	11/9
Desertmartin ..	7/6	Fahan ..	5/3	Hollymount ..	12/-
Devon Road ..	12/9	Falcarragh Road ..	10/3	Hollywood ..	1/9
Dingle ..	11/3	Farranaleen ..	9/3	Horse and Jockey ..	9/-
Doagh ..	2/6	Farranfore ..	11/6	Horseleap ..	8/-
Donabate ..	3/3	Farrangalway ..	6/-	Howth ..	2/9
Donaghadee ..	2/9	Fenit ..	12/6		I.
Donaghmore ..	6/9	Ferbane ..	7/-	Inch ..	6/3
Donamon ..	11/3	Fermoy ..	7/-	Inch Road ..	5/-
Donegal ..	9/6	Ferns ..	7/3	Inniskeen ..	7/3
Donemana ..	5/3	Fethard ..	9/3	Inver ..	11/9
Donoughmore ..	5/6	Fiddown ..	6/6	Irvinestown ..	10/3
Doonbeg ..	15/6	Fintona ..	8/9		J.
Dooniskey ..	6/3	Fintown ..	10/-	Jordanstown ..	2/6
Dooran Road ..	11/9	Firmount ..	5/3		K.
Downhill ..	7/3	Fivemiletown ..	9/3	Kanturk ..	8/3
Downpatrick ..	4/6	Floot ..	8/9	Katesbridge ..	5/6
Draperstown ..	7/9	Florencecourt ..	11/9	Keady ..	7/-
Drinoleague ..	9/6	Foxford ..	12/3	Kells (Ballymena) ..	9/3
Dripsey ..	5/-	Foxhall ..	8/3	" (Meath) ..	6/3
Drogheda ..	2/6	Fox's Bridge ..	5/-	" (Kerry) ..	14/3
Dromahair ..	11/9	Foynes ..	11/9	Kellswater ..	5/6
Dromineer ..	7/9		G.	Kenmare ..	8/9
Dromkeen ..	11/3	Galway ..	5/-	Kesh ..	10/6
Dromod ..	9/6	Garvagh ..	8/6	Kilbeggan ..	7/9
Dromore (Down) ..	4/-	Geashill ..	7/3	Kilcock ..	4/3
Dromore Road ..	9/6	Gibbstown ..	6/6	Kilcoo ..	11/9
Drumfries ..	7/-	Glanworth ..	7/6	Kilcool ..	3/9
Drumhowna ..	9/9	Glarryford ..	6/9	Kilcrea ..	5/-
Drumree ..	4/3	Glasslough ..	7/3	Kildare ..	5/3
Drumshambo ..	11/9	Glenavy ..	4/-	Kildysart ..	12/6
Drumana ..	11/-	Glenbeigh ..	13/3	Kilgarvan (Kerry) ..	11/3
Drum surr ..	7/-	Glenealy ..	5/3	Kilgarvan (Tipp.) ..	8/3
Duleek ..	5/-	Glenfarne ..	13/6	Kilkee ..	15/3
Dunadry ..	4/3	Glengariffe ..	10/3	Kilkenny ..	8/6
Dunboyne ..	3/-	Glenmaquin ..	7/3	Killagan ..	7/-
Duncannon ..	6/6	Glenmore (Donnegal) ..	9/-	Killala ..	11/3
Duncormick ..	8/3	Glienties ..	10/6	Killaloe ..	10/9
Dundalk or D'dalk Junc. ..	5/-	Glin (Kerry) ..	12/6	Killarney ..	10/9
Dundrum (Down) ..	5/6	Glynn ..	4/9	Killeagh ..	6/9
Dundrum (Dublin) ..	2/3	Goold's Cross ..	9/3	Killeshandra ..	10/6
Dundrum (Tipp.) ..	10/6	Goraghtwood ..	5/3	Killinick ..	8/6
Dunfanaghy ..	10/-	Goresbridge ..	8/-	Killorglin ..	12/3
Dunfanaghy Road ..	10/-	Gorey ..	7/3	Killough ..	5/6
Dungannon ..	6/3	Gormanstown ..	4/9	Killucan ..	7/3
Dungarvan ..	7/6	Gort ..	10/6	Killurin ..	7/6
Dungiven ..	7/6	Gortalea ..	11/9	Killybegs ..	11/3
Dungloe Road ..	10/3	Gowran ..	7/9	Killygordon ..	7/6
Dunkineely ..	11/-	Graigus ..	8/3	Killylea ..	6/3
Dunlavin ..	5/6	Grange ..	6/3	Kilmacow ..	6/-
Dunleer ..	5/6	Grange Con ..	6/-	Kilmacrennan ..	9/3
Dunloy ..	7/6	Greencastle ..	2/-		
Dunmanway ..	8/6	Greenisland ..	2/6		
Dunsandle ..	9/6				

	Per Ton.		Per Ton.		Per Ton.
Kilmacthomas ..	7/-	Macmine Juno.	7/6	Newtowncunningham	5/6
Kilmainham Wood ..	7/6	Macroom ..	6/6	Newtownforbes ..	10/-
Kilmallock ..	9/-	Madore ..	9/9	Newtownstewart ..	7/3
Kilmeaden ..	6/3	Maganey ..	6/6	Nobber ..	6/6
Kilmessan ..	5/3	Maghera ..	7/9		
Kilmorna ..	13/3	Magherafelt ..	7/-	O.	
Kilmurry (Cork) ..	5/3	Magheramorne ..	4/6	O'Brien's Bridge ..	10/9
" (Clare) ..	16/3	Magilligan ..	7/-	Oldcastle ..	7/9
Kilrane ..	7/9	Maguiresbridge ..	9/6	Omagh ..	8/3
Kilrea ..	8/3	Malahide ..	2/3	Omeath ..	7/9
Kilroot ..	8/3	Malin Head ..	10/-	Oola ..	10/9
Kilrush ..	12/6	Mallaranny ..	14/-	Oranmore ..	6/9
Kilsheelan ..	8/3	Mallow ..	6/9	Oughterard ..	8/9
Kiltimagh ..	12/9	Manorcunningham ..	7/-	Ovoca ..	5/9
Kilumney ..	4/9	Manorhamilton ..	13/-		
Kincaslagh ..	10/3	Markethill ..	7/-	P.	
Kingscourt ..	7/9	Maryboro' ..	6/6	Palace East ..	7/-
Kinsale ..	6/9	Maynooth ..	3/9	Pallas ..	11/-
Kinsale Juno.	5/3	Middleton ..	4/9	Parkmore ..	8/6
Knockanally ..	7/6	Millford (Carlow) ..	7/3	Parsonstown ..	7/9
Knockcroghery ..	10/9	" (Donegal) ..	10/-	Passage West ..	5/-
Knocklong ..	9/6	Millstreet ..	8/9	Patrick's Well ..	10/-
Knockloughrim ..	7/6	Milltown (Tuam) ..	11/-	Peake ..	5/3
Kylemore ..	9/9	Milltown-Malbay ..	15/9	Pettigo ..	10/9
		Mitchelstown ..	8/3	Philipstown ..	6/3
L.		Moate ..	9/-	Pluck ..	7/6
Labasheeda ..	12/6	Mogeely ..	5/9	Pomeroy ..	7/3
Laffan's Bridge ..	9/9	Mohill ..	11/9	Portadown ..	4/-
Laghey ..	11/9	Moir ..	3/3	Portarlinton ..	5/3
Lahin h ..	15/6	Molahiffe ..	11/9	Portalenone ..	6/6
Lanesborough ..	8/9	Monaghan ..	7/6	Porthall ..	5/6
Larne ..	4/6	Monaghan Road ..	9/3	Portrush ..	6/3
Larne Harbour ..	5/-	Monasterevan ..	5/-	Portsalon ..	10/-
Laurencetown ..	5/-	Moneymore ..	7/9	Portstewart ..	8/3
Laytown ..	5/-	Monkstown (Cork) ..	5/3	Portumna ..	8/9
Leighlinbridge ..	8/-	Moorfields ..	8/9	Poulaphouca ..	4/3
Leitrim ..	5/9	Morley's Bridge ..	11/-	Poyntzpass ..	6/-
Leixlip ..	3/-	Mountain Stage ..	15/6		
Letterkenny ..	7/-	Mountcharles ..	10/-	Q.	
Levitstown ..	6/6	Mountmellick ..	6/3	Queenstown ..	6/3
Leyny ..	11/3	Mountpleasant ..	7/6	Queenstown Juno. ..	4/9
Limavady ..	6/3	Mountrath ..	8/-	Quilty ..	16/-
" Juno. ..	5/9	Mountshannon ..	10/3	Quin ..	12/3
Limerick ..	8/9	Mourne Abbey ..	6/3		
" Juno. ..	9/3	Moville ..	6/3	R.	
Lisbellaw ..	9/9	Moy ..	5/6	Raffeen ..	5/3
Lisburn ..	2/-	Moycullen ..	7/-	Rahan ..	6/6
Liscooley ..	7/-	Muckamore ..	4/-	Ramelton ..	8/3
Lisduff ..	7/9	Mullafarnaghan ..	4/6	Randalstown ..	5/3
Liselton ..	17/-	Mullinavat ..	6/3	Raphoe ..	6/9
Lismore ..	8/6	Mullingar ..	7/6	Rathangan ..	5/6
Lisnagry ..	11/3	Mulroy ..	10/-	Rathcoole ..	8/3
Lisnaskea ..	9/3	Multyarnham ..	8/3	Rathdrum ..	4/9
Lispole ..	13/6			Rathduff ..	5/6
Listowel ..	13/9	N.		Rathfriland ..	9/6
Lixnaw ..	13/6	Naas ..	3/6	Rathkeale ..	11/-
Lombardstown ..	7/6	Navan ..	5/6	Rathkenny ..	7/6
Londonderry ..	2/6	Nenagh ..	7/9	Rathmore ..	9/6
Longford ..	9/9	Newbliss ..	9/-	Rathmullen ..	8/3
Loo Bridge ..	10/6	Newbridge ..	4/6	Rathnew ..	4/9
Loughgilly ..	7/3	Newbuildings ..	4/6	Rathvilly ..	6/6
Loughrea ..	10/6	Newcastle (Down) ..	5/6	Recess ..	10/9
Lowtown ..	4/6	Newcastle West ..	11/9	Red Gap ..	12/6
Lucan ..	2/6	Newcastle (Wicklow) ..	3/9	Redhills ..	9/3
Lurgan ..	4/-	Newmarket (Cork) ..	8/9	Retreat ..	8/6
Lusk ..	3/6	Newport (Mayo) ..	12/-	Rhoda Bridge ..	4/9
Luska ..	7/9	Newport Trench ..	5/6	Richhill ..	5/6
		New Ross ..	6/3	Ringaskiddy ..	6/3
M.		Newry ..	5/-	Robertstown ..	4/6
Maam Cross ..	10/3	Newtownards ..	2/3	Rochestown ..	4/6
Macfin Juno.	8/-	Newtownbutler ..	9/-	Rockcorrv ..	10/-



	Per Ton.		Per Ton.		Per Ton.
Rooskey ..	7/3	Sparrowsland Sdg.	7/6	Tubbercurry ..	11/3
Roscommon ..	11/3	Spike Island ..	7/6	Tullamore ..	6/-
Roscrea ..	8/9	Staffordstown ..	6/-	Tullow ..	7/6
Ross ..	7/9	Stewartstown ..	7/-	Tullymurry ..	5/3
Rossclare ..	7/6	Strabane ..	4/9	Tynan ..	6/9
Rossmore ..	8/9	Straffan ..	3/6		
Rossnowlagh ..	12/-	Stranocum ..	10/3	U.	
Rush and Lusk ..	3/6	Stranorlar ..	7/9	Upperlands ..	7/9
Rushbrook ..	5/6	Streamstown ..	7/9	Upton ..	5/6
		Swinford ..	13/3		
S.				V.	
St. Anne's ..	4/3			Valentia Harbour ..	11/3
Saintfield ..	2/9	T.		Vernersbridge ..	5/9
St. Johnston ..	4/9	Tallaght ..	1/-	Vicarstown ..	7/6
St. Mullins ..	8/3	Tallow Road ..	8/3	Victoria Bridge ..	6/9
Sallins ..	3/6	Tanderagee ..	5/-	Virginia Road ..	7/-
Sallybrook ..	6/9	Tarbert ..	12/6		
Scariff ..	10/3	Templemore ..	6/6	W.	
Scarva ..	5/9	Templepatrick ..	3/-	Warrenpoint ..	7/-
Schull ..	10/6	The Lamb ..	3/-	Waterfall ..	4/6
Shankill ..	2/9	Thomastown ..	8/-	Waterford ..	3/9
Shannon Bridge ..	8/3	Thurles ..	7/3	Wellington Bridge ..	7/9
" Harbour ..	6/9	Timoleague ..	8/3	Westport ..	10/-
Shillelagh ..	7/3	Tinahely ..	6/9	Westport Quay ..	10/-
Sion Mills ..	6/6	Tipperary ..	10/3	Wexford ..	6/3
Sixmilebridge ..	11/9	Toomebridge ..	6/3	Whiteabbey ..	2/-
Sixmilecross ..	8/3	Tralee ..	10/-	Whitehead ..	3/9
Skerries ..	4/-	Tramore ..	5/6	Wicklow ..	2/6
Skibbereen ..	9/9	Trew and Moy ..	6/-	Wilkinstown ..	6/9
Sligo ..	8/9	Trillick ..	9/9	Woodenbridge ..	5/9
Smithborough ..	8/3	Trim ..	5/9	Woodlawn ..	10/-
Sneam ..	11/3	Tuam ..	9/6	Y.	
Spa ..	12/3	Tubber ..	11/-	Youghal ..	7/-

A.B. MEMO. No. 10.

## DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

### MARKETING OF EGGS.

As nearly all the eggs exported from Ireland are sent to Great Britain, it is to the interest of Irish producers and shippers of eggs that they should be marketed in such condition and style as will secure for them the highest prices in British markets.

The Department have already issued a "Memorandum to Producers" (A.B. Memo. No. 12), dealing with objectionable practices, and advising as to the adoption of those methods of treating eggs which will ensure their being brought to market clean and in good condition. They have also issued a memorandum on "Testing Eggs for Freshness" (A.B. Memo. No. 11) and another on the "Purchase of Eggs by Weight" (A.B. Memo. No. 13), illustrating the advantages which would accrue both to the producer and to the Irish buyer by the adoption of the system of purchase by weight. Copies of these publications can be obtained from the Department.

The chief causes for complaint by British Buyers concerning Irish eggs are :—

1. Want of cleanliness.
2. Staleness.
3. Mustiness.
4. Breakages during transit.

It lies with the buyers of eggs to remedy the first fault named, by differentiating in price between clean and dirty eggs; and the second, by testing the eggs in a beam of bright light, especially when the price for eggs is rising; and by refusing to buy stale eggs. They should urge producers to carry out the recommendations contained in the "Memorandum to Producers" above referred to.

The third objectionable condition, "mustiness," is undoubtedly due sometimes to exposure of the packed cases to wet during transit, but is more often caused by the use of damp packing material, or of cases made of unseasoned wood, by packing in the open in wet weather, by the use of cases damped by exposure to rain before being used, or by neglect to protect the cases from rain when carting them in wet weather. As mustiness is a common cause of complaint, shippers of eggs should adopt every precaution to prevent its occurrence.

The question of breakages, and claims arising therefrom, is one which has caused, and is causing, much trouble, vexation, and loss to consignors, consignees, and carriers. The Department have given very earnest attention to this matter for some time and, through their officers, have obtained detailed reports with respect to the condition on arrival of a large number of cases of different types, which were forwarded from various Irish stations to a number of towns in England and Scotland. The experience thus gained indicates that breakages during transit may generally be attributed to :—

- (a) The use of cases which are unsuitable or badly constructed.
- (b) Bad packing.
- (c) Rough handling.

While there is no doubt that many Irish egg shippers, including some of the largest firms in the trade, use excellent cases and pack in thoroughly good style, there are also many of whom the opposite may be stated, such faults as the following being common, viz., insufficiency of packing material, the use of cases made of wood of insufficient thickness, of insufficient capacity for their contents, of bad construction, and with too wide spaces between boards, whereby pilferage is facilitated.

It appeared to the Department that many of the evils above referred to would be greatly minimised, and that it would be beneficial to all the interests concerned, if standard packages could be adopted for the Irish egg trade. They, therefore, invited the representatives of many of the leading firms of Irish shippers and case makers, and of the Railway Companies concerned in the Irish trade, to confer with them on this important matter. As a result of these conferences, the Department feel justified in recommending for adoption by Irish shippers of eggs, standard egg cases, the

specifications of which are set out in this memorandum, and it is hoped that these will meet with the approval of the trade and will be generally adopted.

It will be observed that as many as ten distinct cases have been approved. This appeared to be necessary in order to provide two sizes of the larger flat type, and also to provide for packing in layers of both nine and ten rows. Every effort has been made to avoid unnecessary cost, and, at the same time, provide for sufficient strength and packing capacity.

The trial shipments of egg cases, referred to above, indicated that if eggs are carefully packed in the standard packages herein recommended, subject to the prescribed conditions, the breakages should not exceed 2 per 120; that the flat 6 hhd. cases, Nos. 7 (A and B), are those in which breakages of eggs are likely to be greatest, and that the cases in which least breakage occurred, and which are strongly recommended for adoption by Irish shippers, are the 12 hhd. cases, Nos. 1 and 2; the divisible 6 hhd. cases, Nos. 5 and 6; and the 8 hhd. cases, Nos. 9 and 10.

It is generally admitted by the trade that Irish eggs, if marketed fresh and clean and well packed, are at least equal to any others and superior to most; it, therefore, rests largely with Irish producers and shippers to ensure that Irish eggs shall attain that superiority which they should possess.

The points to which special attention should be directed are the following:—

Producers to provide clean, fresh eggs, as advised in the "Memorandum to Producers";

Eggs to be tested by light test on rising markets. Stale eggs to be refused; soiled eggs to be bought at reduced prices;

The "holding over" of eggs by producers or buyers to cease;

Eggs to be packed in clean, dry, well-made standard cases;

Eggs to be graded to fixed weights per 120, so that no egg in any package shall vary appreciably in size from the average egg of that package;

The purchase of eggs by weight, as advised in the Memorandum, "Purchase of Eggs by Weight";

The top layer of eggs in a case to be representative of all eggs in the case as to size and colour;

Hand or tray packing to be adopted; preferably hand packing;

Absolutely dry oat straw, or wood wool free from objectionable odour, to be used for packing;

Packing cases, straw and wood wool, to be kept dry and under cover until required for use;

Covered premises to be available, and to be used for packing when the weather conditions are unsuitable for packing out-of-doors;

Suitable waterproof sheeting to be provided for protecting empty or full cases when they are moved by road in wet or showery weather, or when they are not stored under cover;

Cases containing 6 hhd. eggs or upwards to be lifted by two people when moved on or off vehicles, or into or out of wagons, etc.

## SPECIFICATIONS OF STANDARD EGG CASES APPROVED BY THE DEPARTMENT.

*The figures given in the following specifications are to be regarded throughout as minimum dimensions. All timber thicknesses must be actual, not nominal.*

*The general conditions of pages 342 and 343 should be examined carefully.*

### CASE No. 1.

**12 HHD. CASE** to be used only for eggs not exceeding 15 lbs. per 120.

#### *Description.*

To be made in two compartments, each to hold 6 hhd. eggs, packed in 4 layers, each containing 10 rows of eggs, with 18 eggs in each row.

#### *Internal Dimensions.*

- (a) The internal dimensions of each compartment to be not less than  $34\frac{3}{4}$  inches long, 23 inches broad, 9 inches deep.

#### *Ends and Posts.*

- (b) The case to have end pieces, each board in which shall not be less than 23 inches by 3 inches by  $\frac{5}{8}$  inch, and one centre cross division not less than 23 inches by 9 inches by  $\frac{7}{8}$  inch, the side boards and end pieces to be nailed to corner angle posts.

#### *Sides.*

- (c) The side boards to be not less than 4 inches wide and  $\frac{7}{8}$  inch thick, and of the full outside length of the case.

#### *Tops and Bottoms.*

- (d) Top and bottom boards to be not less than 5 inches wide and  $\frac{7}{8}$  inch thick.

#### *General Conditions.*

For further particulars and conditions as to the making up of this case, see General Conditions, pages 342 and 343.

#### *Timber.*

The 12 hhd. case, as above specified, can be constructed of wood of the following dimensions:—two ends, 23 inches by 9 inches by  $\frac{5}{8}$  inch; one centre cross division, 23 inches by 9 inches by  $\frac{7}{8}$  inch; two sides,  $71\frac{1}{2}$  inches by 9 inches by  $\frac{7}{8}$  inch; six tops and bottoms,  $71\frac{1}{2}$  inches by 7 inches by  $\frac{7}{8}$  inch; four corner angle posts, 9 inches by  $1\frac{3}{4}$  inches square, cut diagonally.

### CASE No. 2.

**12 HHD. DIVISIBLE CASE**, to be used for not more than 12 hhd. eggs, not exceeding 17 lbs. per 120, or for not more than 10 hhd. eggs exceeding 17 lbs. per 120.

#### *Description.*

To be made in two compartments, each to hold 6 hhd. eggs not exceeding 17 lbs. per 120, packed in 4 layers, each containing 10 rows of eggs, with 18 eggs in each row; or 5 hhd. eggs exceeding

17 lbs. per 120, packed in 4 layers, each containing 10 rows of eggs, with 15 eggs in each row.

*Internal Dimensions.*

- (a) The internal dimensions of each compartment to be not less than  $36\frac{1}{2}$  inches long, 23 inches broad, 9 inches deep.

*Ends and Posts.*

- (b) The case to have four end pieces, each not less than 23 inches by 9 inches by  $\frac{7}{8}$  inch; or to be fitted with eight corner angle posts, in which case the end pieces must be not less than 23 inches by 3 inches by  $\frac{5}{8}$  inch.

*Sides.*

- (c) The side boards to be not less than  $\frac{7}{8}$  inch thick and 4 inches wide and of the full outside length of the case.

*Tops and Bottoms.*

- (d) Top and bottom boards to be not less than 5 inches wide and  $\frac{7}{8}$  inch thick.

*General Conditions.*

For further particulars and conditions as to the making up of this case, see General Conditions, pages 342 and 343.

*Timber.*

The 12 hhd. case, as above specified, can be constructed of wood of the following dimensions—four ends, 23 inches by 9 inches by  $\frac{7}{8}$  inch; two sides,  $76\frac{1}{2}$  inches by 9 inches by  $\frac{7}{8}$  inch; six tops and bottoms,  $76\frac{1}{2}$  inches by 7 inches by  $\frac{7}{8}$  inch; or the ends may be  $\frac{5}{8}$  inch thick with eight corner angle posts, in which case the length of the side boards may be reduced to  $75\frac{1}{2}$  inches.

CASE No. 3.

8 HHD. DIVISIBLE CASE, to be used only for eggs not exceeding 15 lbs. per 120.

*Description.*

To be made in two compartments, each to hold 4 hhd. eggs packed in 4 layers, each containing 10 rows of eggs, with 12 eggs in each row.

*Internal Dimensions.*

- (a) The internal dimensions of each compartment to be not less than  $24\frac{1}{2}$  inches long, 23 inches broad, 9 inches deep.

*Ends.*

- (b) The case to have four end pieces, each not less than 23 inches by 9 inches by  $\frac{5}{8}$  inch.

*Sides.*

- (c) The side boards to be not less than 4 inches wide and  $\frac{3}{8}$  inch thick, and of the full outside length of the case.

*Tops and Bottoms.*

- (d) Top and bottom boards to be not less than 3 inches wide and  $\frac{3}{8}$  inch thick.

*General Conditions.*

For further particulars and conditions as to the making up of this case see General Conditions, pages 342 and 343.

*Timber.*

The 8 hhd. case, as above specified, can be constructed of wood of the following dimensions:—four ends, 23 inches by 9 inches by  $\frac{5}{8}$  inch; two sides, 51 inches by 9 inches by  $\frac{3}{8}$  inch; six tops and bottoms, 51 inches by 7 inches by  $\frac{3}{8}$  inch.

## CASE NO. 4.

8 HHD. DIVISIBLE CASE for eggs of all grades.

*Description.*

To be made in two compartments, each to hold 4 hhd. eggs, packed in 4 layers, each containing 10 rows of eggs, with 12 eggs in each row.

*Internal Dimensions.*

- (a) The internal dimensions of each compartment to be not less than  $25\frac{1}{2}$  inches long, 23 inches broad, 9 inches deep.

*Ends.*

- (b) The case to have four end pieces, each not less than 23 inches by 9 inches by  $\frac{5}{8}$  inch.

*Sides.*

- (c) The side boards to be not less than 4 inches wide and  $\frac{3}{8}$  inch thick, and of the full outside length of the case.

*Tops and Bottoms.*

- (d) Top and bottom boards to be not less than 3 inches wide and  $\frac{3}{8}$  inch thick.

*General Conditions.*

For further particulars and conditions as to the making up of this case see General Conditions, pages 342 and 343.

*Timber.*

The 8 hhd. case, as above specified, can be constructed of wood of the following dimensions:—four ends, 23 inches by 9 inches by  $\frac{5}{8}$  inch; two sides, 54 inches by 9 inches by  $\frac{3}{8}$  inch; six tops and bottoms, 54 inches by 7 inches by  $\frac{3}{8}$  inch.

## CASE NO. 5.

6 HHD. DIVISIBLE CASE for all grades of eggs.

*Description.*

To be made in two compartments, each to hold 3 hhd. eggs, packed in 3 layers, each containing 10 rows of eggs, with 12 eggs in each row.

*Internal Dimensions.*

- (a) The internal dimensions of each compartment to be not less than  $25\frac{1}{2}$  inches long, 23 inches broad, 7 inches deep. (Each compartment is of the internal dimensions of No. 9 case.)

*Ends.*

- (b) The case to have four end pieces, each not less than 23 inches by 7 inches by  $\frac{3}{8}$  inch; or to be fitted with eight corner angle posts, in which case each board in the end pieces must be not less than 23 inches by 3 inches by  $\frac{3}{8}$  inch.

*Sides.*

- (c) The side boards to be not less than 3 inches wide and  $\frac{3}{8}$  inch thick, and of the full outside length of the case.

*Tops and Bottoms.*

- (d) Top and bottom boards to be not less than 4 inches wide and  $\frac{3}{8}$  inch thick.

*General Conditions.*

For further particulars and conditions as to the making up of this case see General Conditions, pages 342 and 343.

*Timber.*

The 6 hhd. case, above specified, can be constructed of wood of the following dimensions:—four ends, 23 inches by 7 inches by  $\frac{3}{8}$  inch; two sides, 54 inches by 7 inches by  $\frac{3}{8}$  inch; six tops and bottoms, 54 inches by 7 inches by  $\frac{3}{8}$  inch.

## CASE NO. 6.

## 6 HHD. DIVISIBLE CASE, for all grades of eggs.

*Description.*

To be made in two compartments, each to hold 3 hhd. eggs, packed in three layers, each containing 9 rows of eggs, with 13 in each row, and 3 odd. (Each compartment is of the internal dimensions of No. 10 case.)

*Internal Dimensions.*

- (a) The internal dimensions of each compartment to be not less than 29 inches long, 22 inches broad, 7 inches deep.

*Ends.*

- (b) The case to have four end pieces, each not less than 22 inches by 7 inches by  $\frac{3}{8}$  inch; or to be fitted with eight corner angle posts, in which case each board in the end pieces must be not less than 22 inches by 3 inches by  $\frac{3}{8}$  inch.

*Sides.*

- (c) The side boards to be not less than 3 inches wide and  $\frac{3}{8}$  inch thick, and of the full outside length of the case.

*Tops and Bottoms.*

- (d) Top and bottom boards to be not less than 4 inches wide and  $\frac{3}{8}$  inch thick.

*General Conditions.*

For further particulars and conditions as to the making up of this case see General Conditions, pages 342 and 343.

*Timber.*

The 6 hhd. case, above specified, can be constructed of wood of the following dimensions:—four ends, 22 inches by 7 inches

by  $\frac{7}{8}$  inch; two sides,  $60\frac{5}{8}$  inches by 7 inches by  $\frac{3}{8}$  inch; two tops and bottoms,  $60\frac{5}{8}$  inches by 6 inches by  $\frac{3}{8}$  inch; four tops and bottoms,  $60\frac{5}{8}$  inches by 7 inches by  $\frac{3}{8}$  inch.

#### CASE No. 7A.

6 HHD. CASE, to be used for not more than 6 hhd. eggs, not exceeding 17 lbs. per 120, or for not more than 5 hhd. eggs, exceeding 17 lbs. per 120.

##### *Description.*

To be made in one compartment to hold 6 hhd. eggs, not exceeding 17 lbs. per 120, packed in 4 layers, each containing 10 rows of eggs, with 18 eggs in each row; or 5 hhd. eggs exceeding 17 lbs. per 120, packed in 4 layers, each containing 10 rows of eggs, with 15 eggs in each row.

##### *Internal Dimensions.*

- (a) The internal dimensions to be not less than  $36\frac{1}{2}$  inches long, 23 inches broad, 9 inches deep.

##### *Ends.*

- (b) The case to have two end pieces, each not less than 23 inches by 9 inches by  $\frac{7}{8}$  inch; or to be fitted with four corner angle posts, in which case the end pieces must be not less than 23 inches by 3 inches by  $\frac{3}{8}$  inch.

##### *Sides.*

- (c) The side boards to be not less than  $\frac{7}{8}$  inch thick and 4 inches wide, and of the full outside length of the case.

##### *Tops and Bottoms.*

- (d) Top and bottom boards to be not less than 5 inches wide and  $\frac{7}{8}$  inch thick; or the top of the case may be constructed as specified for the top of No. 7B, and clasped on.

##### *Timber.*

The 6 hhd. case, above specified, can be constructed of wood of the following dimensions:—two ends, 23 inches by 9 inches by  $\frac{7}{8}$  inch; two sides, 38 inches by 9 inches by  $\frac{7}{8}$  inch; six tops and bottoms, 38 inches by 7 inches by  $\frac{7}{8}$  inch.

Subject to the conditions as to "description, internal dimensions and sides," prescribed for Case No. 7A, that case may be constructed in accordance with the following specification:—

#### CASE No. 7B.

##### *Ends and Posts.*

The case to have four corner angle posts, and four end pieces each not less than 23 inches long by 4 inches wide by  $\frac{7}{8}$  inch thick.

##### *Tops and Bottoms.*

No top or bottom board or batten to be less than 3 inches wide and  $\frac{7}{8}$  inch thick; the bottom to be made of boards laid across the case, fastened by clinched nails to two battens laid lengthways, and to be attached by a 2-inch nail



driven slightly askew through each batten and outside bottom board into each corner post. The top of the case to be made of boards running lengthways, fastened by clinched nails to three battens placed crossways, one batten at each end and one in the centre; the top and bottom battens to be outside the boards; the bottom to be further secured at each corner and the middle of each batten by an iron or steel clasp not less than 24 gauge in thickness nor  $\frac{5}{8}$  inch in width; the top cover to be fastened down by similar clasps at each corner.

#### *General Conditions.*

For further particulars and conditions as to the making up of this case see General Conditions, pages 342 and 343.

#### CASE No. 8.

6 HHD. DEEP CASE, to be used for not more than 6 hhd. eggs, not exceeding 17 lbs. per 120, or for not more than 5 hhd. eggs, exceeding 17 lbs. per 120.

#### *Description.*

To be made in one compartment, to hold 6 hhd. eggs, not exceeding 17 lbs. per 120, packed in 6 layers each containing 9 rows of eggs, with 13 in each row and 3 odd; or 5 hhd. eggs exceeding 17 lbs. per 120, packed in 6 layers, each layer containing 9 rows of eggs, with 11 in each row and 1 odd.

#### *Internal Dimensions.*

- (a) The internal dimensions to be not less than 29 inches long, 21 inches broad, 13 inches deep.

#### *Ends.*

- (b) The end pieces to be not less than 21 inches long, 4 inches wide, and  $\frac{3}{8}$  inch thick, nailed to four corner angle posts.

#### *Sides.*

- (c) The side boards to be not less than 4 inches wide and  $\frac{3}{8}$  inch thick, and of the full outside length of the case.

#### *Tops and Bottoms.*

- (d) Top and bottom boards and battens to be not less than  $2\frac{1}{2}$  inches wide, and  $\frac{3}{8}$  inch thick; the bottom to be made of boards laid across the case, fastened by clinched nails to two battens laid lengthways, and to be attached by a 2-inch nail driven slightly askew through each batten and outside bottom board into each corner angle post. The top of the case to be made of boards running lengthways, fastened by clinched nails to three battens placed cross ways, one batten at each end and one in the centre, the top and bottom battens to be outside the boards; the bottom to be further secured at each corner and the middle of each batten by an iron or steel clasp not less than 24 gauge in thickness nor  $\frac{5}{8}$  inch in width; the top cover to be fastened down with similar clasps at each corner.

*General Conditions.*

The end and side boards shall be so attached to the corner angle posts that the top edge of each upper board and the bottom edge of each lower board shall be level with the upper and lower ends, respectively, of the corner angle posts, and the outer edges of the outer top boards and bottom battens shall be flush with the outer sides of the side boards. The space between any two adjoining side or end boards shall nowhere exceed  $1\frac{1}{4}$  inches.

For further particulars and conditions as to the making up of this case see General Conditions, pages 342 and 343.

## CASE No. 9.

[3 HHD. CASE for all grades of eggs.

*Description.*

To be made in one compartment, to hold 3 hhd. eggs, packed in 3 layers, each to contain 10 rows of eggs with 12 eggs in each row.

*Internal Dimensions.*

- (a) The internal dimensions to be not less than  $25\frac{3}{4}$  inches long, 23 inches broad, 7 inches deep.

*Ends.*

- (b) The case to have two end pieces, each not less than 23 inches by 7 inches by  $\frac{3}{8}$  inch.

*Sides.*

- (c) The side boards to be not less than 3 inches wide and  $\frac{3}{8}$  inch thick, and of the full outside length of the case.

*Tops and Bottoms.*

- (d) The case to have three top boards and three bottom boards, each not less than  $\frac{3}{8}$  inch thick.

*General Conditions.*

For further particulars and conditions as to the making up of this case see General Conditions, pages 342 and 343.

*Timber.*

The 3 hhd. case, above specified, can be constructed of wood of the following dimensions:—two ends, 23 inches by 7 inches by  $\frac{3}{8}$  inch; two sides, 27 inches by 7 inches by  $\frac{3}{8}$  inch; six tops and bottoms, 27 inches by 7 inches by  $\frac{3}{8}$  inch.

## CASE No. 10.

3 HHD. CASE, for all grades of eggs.

*Description.*

To be made in one compartment, to hold not more than 3 hhd. eggs, packed in 3 layers.

*Internal Dimensions.*

- (a) The internal dimensions to be not less than 29 inches long, 22 inches broad, 7 inches deep.

*Ends.*

- (b) The end pieces to be not less than 22 inches long and  $\frac{3}{8}$  inch thick, nailed to four corner angle posts.

*Sides.*

- (c) The side boards to be not less than 3 inches wide and  $\frac{3}{8}$  inch thick, and of the full outside length of the case.

*Tops and Bottoms.*

- (d) The conditions of Clause (d), Case No. 8, to apply to this case.

*General Conditions.*

The General Conditions laid down for Case No. 8 apply to this case.

For further particulars and conditions for the making up of this case see General Conditions below.

## GENERAL CONDITIONS.

*Centre Divisions.*

- (1.) The end pieces which form the centre division of all divisible cases, to be nailed  $\frac{1}{8}$  inch apart on each side of the centre of the case, thus leaving a saw space of  $\frac{1}{8}$  inch, to permit of the case being cut in two on delivery.

*Tops and Bottoms.*

- (2.) The outer edges of the outside top and bottom boards and bottom battens, when nailed on, to be flush with the outer sides of the side boards, and the space between any two adjoining top or bottom boards nowhere to exceed  $1\frac{1}{2}$  inches.

*Hand Holes.*

- (3.) Suitable hand holes not exceeding 1 inch in depth and  $4\frac{1}{2}$  inches in length to be cut out of the side boards of all cases, except when two boards are used on each side with a space of not less than one inch between them.

*Timber.*

- (4.) The wood used to be well seasoned, clean, dry, and free from wane and feather.

*Side Boards.*

- (5.) Three boards may be used for the side of Case No. 8, and two boards may be used for the side of any other case, subject to the following conditions:—

- (a) No side board for Cases Nos. 5, 6, 9, or 10 shall be less than 3 inches wide. No side board for any other case shall be less than 4 inches wide.
- (b) The space between two side boards shall nowhere exceed  $1\frac{1}{4}$  inches.
- (c) The side boards shall be so fixed that the top edge of the upper board, and the bottom edge of the lower board shall be level with the top and bottom edges, respectively, of the end boards.

- (d) When more than one board is used to form a side of any case which is not fitted with corner angle posts, corner battens of the full depth of the case, and not less than 2 inches wide by  $\frac{1}{2}$  inch thick, shall be attached vertically by clinched nails to each end of each outer end board, and the side boards, which shall not be spaced, shall be nailed to the battens as well as to the end boards; if the side boards are spaced, corner angle posts must be fitted.

#### *End Boards.*

(6.) When more than one end board is fitted at one end of a case, if the end boards are spaced they must be nailed to corner angle posts, and the space between any two end boards must not exceed  $1\frac{1}{4}$  inches; if the end boards are not spaced, corner battens may be used as specified in condition (5) (d), but if in such a case two boards are used on one side, there must be a break of not less than 2 inches between the joints in the end and side boards; in any case the upper edge of the upper end board and the lower edge of the lower board must be of the full internal depth of the case apart.

#### *Corner Angle Posts.*

(7.) All corner angle posts must be of the full internal depth of the case, and not less than  $1\frac{1}{2}$  inches square, cut diagonally. *Square cut corner posts are not permissible.* Corner battens may be used instead of corner angle posts, subject to conditions (5) (d) and (6).

#### *Nails.*

(8.) Not less than 2 nails to be used in each end of each board, and an additional nail to be used at each end of a board for every 3 inches or part of 3 inches by which the board exceeds 4 inches in width. When corner angle posts are fitted, each end of each side board shall be secured by at least 2 nails driven into the end boards and at least one nail driven into the corner post.

Nails to be used as follows:—

For nailing sides to end pieces ..	2 inch nails of 13 gauge.
For securing bottoms to corner posts .. .. .	2 .. 13 ..
For securing sides and ends to corner posts .. .. .	$1\frac{1}{2}$ .. 14 ..
For securing top and bottom boards to battens .. .. .	1 .. 14 ..
For use elsewhere .. .. .	$1\frac{1}{2}$ .. 14 ..

It is recommended that cement coated wire nails be used, and that, so far as possible, nails should be driven askew the grain of the wood.

The figures given in the foregoing specifications are to be regarded throughout as minimum dimensions; if it is desired to use end boards of greater thickness than those specified, care should be exercised to ensure that the internal length of each compartment is not less than the minimum length specified.

*All timber thicknesses must be actual and not nominal.*

## DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

### MARKETING OF EGGS.

#### CLASSIFICATION OF EGG SHIPPERS.

To facilitate the Department in co-operating with Irish Egg Shippers for the general improvement of the egg trade, and with the object of enhancing the value of Irish exported eggs as compared with those of foreign countries, Irish egg shippers will be classified by the Department in accordance with the conditions herein set forth. The classification will be based on reports received by the Department from their inspectors and from other sources regarded as reliable. It is expected that Irish egg shippers will cordially assist the Department in carrying out this scheme.

Egg shippers whose methods of handling eggs are such that they may be assisted by the Department in marketing, will be placed in Classes A, B, or C; all others in Class X.

Class A represents those shippers who conform to *all* conditions recommended by the Department.

Class B represents those shippers who do not conform to *all* conditions recommended by the Department.

Class C represents shippers who generally handle and pack well, but fail in certain important particulars to conform to several of the Department's recommendations.

A shipper who is regarded as coming under Class B or C will be transferred to Class A or B when the Department are satisfied that he conforms to the conditions to be observed by such class.

Assistance in marketing will not be given to any shippers who fall below Class C, but the Department's marketing inspectors will, when it is desired, give advice and instructions to such shippers, so far as circumstances permit of doing so, with a view to enabling them to qualify for classification.

#### CONDITIONS WHICH MUST BE OBSERVED BY CLASS A.

1. Packing cases to be clean, dry, and well seasoned.
2. Packing material to consist of straw or wood wool, and to be clean, dry, and free from objectionable odour.
3. Packing cases and packing material to be stored under cover.
4. Eggs which are not fit for human consumption (Definition (a)), and stale eggs as defined hereafter (Definition (b)), not to be packed with eggs which are intended for human consumption.
5. The top layer of eggs in any case to be representative of the bulk, as to size, colour and appearance.
6. Covered premises to be available, and to be used for packing eggs when the weather conditions are unsuitable for packing out of doors.
7. Waterproof sheeting to be used to protect empty and packed cases from wet during cartage and when not under cover.
8. All eggs intended for human consumption to be packed in standard packages, as specified in A.B. Memo. No. 10, subject to the conditions therein prescribed relative to the use of such packages;

or in such other special types of cases varying from standard packages as may be approved by the Department, subject to the observance of suitable conditions for the use of such cases.

9. Eggs to be graded to specified weights per hhd., so that no egg shall vary appreciably in size from the average of the case.

10. Soiled eggs as hereafter defined (Definition (c)), to be shipped separately as such.

11. Eggs to be packed by hand or by tray only, preferably by hand.

12. Eggs to be tested by a suitable light test on rising markets, and from June to December inclusive.

13. Duck eggs not to be packed in the same case with hen eggs.

#### CONDITIONS WHICH MUST BE OBSERVED BY CLASS B.

Class B must observe all the conditions numbered 1 to 13, which are to be observed by Class A, except conditions 8 and 9, the observance of either of which conditions, though desirable, is not obligatory as to Class B. Shippers in Class B who fail to comply with condition No. 8, must comply with condition No. 14, and those who fail to comply with condition No. 9 must comply with condition No. 15.

14. All eggs intended for human consumption shall be packed in standard or other approved types of cases, as defined in condition No. 8, except that the internal dimensions of the types of cases specified in Memo. No. 10 may be less than is therein specified, provided that the dimensions are sufficient for the grades of eggs handled and the systems of packing adopted.

15. Eggs may be merely selected as to size, provided that small eggs under 14 lbs. per 120 are excluded and packed separately as smalls.

#### CONDITIONS WHICH MUST BE OBSERVED BY CLASS C.

Class C must observe all the conditions which are to be observed by Class B. except conditions 10, 11, 12, and 13, the observance of any one of which, although desirable, is not obligatory as to Class C.

#### DEFINITIONS.

(a) An egg shall be regarded as unfit for human consumption if on examination in a bright beam of light it presents any of the following appearances, viz.:—

- (1) If it is opaque or black.
- (2) If the white is dull and cloudy, and the yoke cannot be distinguished: this usually indicates a broken or spread yolk, and the egg is described as "spent."
- (3) If the yolk is anywhere in contact with the shell, under which condition an egg is described as "sided." Contact is denoted by a spot on the inner side of the shell, and also by the fact that when the egg is turned the yolk remains adhering to the shell.
- (4) If it contains large blood spots, or has spots under the shell caused by dampness.

(b) An egg shall be regarded as stale if the air space in it exceeds the size of a halfpenny, or is more than one inch in its greatest width.

(c) An egg shall be regarded as soiled if it bears a dirt mark or stain which might appreciably affect its selling value.

### BRANDING.

In order to bring about greater uniformity in the branding of egg cases, it is strongly recommended that the following system of branding should be adopted by all egg shippers, the shippers' special brands to be used in addition, if desired:—

I. A number followed by the letters "L.B.," thus "16 LB.," shall signify the number of pounds avoirdupois to which the eggs in the case are graded; that they do not weigh less than that weight per hhd.; and that no eggs in the case vary appreciably from that weight.

II. "Extra Selected" shall signify that the case does not contain soiled eggs, stale eggs, eggs which are not fit for human consumption, or eggs weighing less than 15 lb. per hhd., and that the average weight of the eggs in the case is 16 lb. per hhd.

III. "Selected" shall signify that the case does not contain soiled eggs, stale eggs, eggs which are not fit for human consumption, or eggs weighing less than 14 lb. per hhd., and that the average weight of the eggs in the case is not less than 15 lb. per hhd.

IV. "Ungraded" shall signify that the eggs in the case are ungraded as to size, or that they are soiled.

V. A number followed by the letters "HD.," thus "6 HD.," shall signify the number of hhd. in the case.

VI. The letter "D" on a case shall indicate that the case contains duck eggs only.

VII. The letters and figures used for marking cases shall not be less than one inch long.

VIII. Every case should bear an identification number, which should be noted on the consignment note and on the invoice.

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A.B. MEMO. No. 11.

### DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

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#### TESTING EGGS FOR FRESHNESS.

Buyers of eggs complain that during the latter half of the year cases of Irish eggs frequently contain a large proportion of stale and bad eggs. Shippers who desire to maintain a high reputation and to be in a position to guarantee their eggs should, therefore test as to freshness all eggs passing through their hands when markets are rising, and from June to December inclusive. The adoption of this practice would appear to be absolutely necessary, if Irish shippers wish not merely to improve their position on British markets, but to hold that which they at present occupy.

Eggs should be tested for freshness by holding them in the beam cast by a partially shaded bright light in a room from which other

light has been excluded. A simple arrangement is to cut an oval hole of about  $2\frac{1}{2}$  inches by  $1\frac{1}{2}$  inch in a tin or other cylinder within which a lamp giving a bright light is to be placed. The edge of the hole should be protected by a cloth flap. A second hole may be cut in the cylinder in such a position that a second beam of light shall be cast opposite to or in a different direction from the other. Each egg to be tested should be turned completely round so as to permit of its thorough examination while it is held in the beam of light close to the hole through which the light is emitted. Various adaptations of electric, gas, and oil lamps may be used for testing. An operator with a moderate amount of practice should be able to examine carefully 70 to 90 dozen eggs per hour in the manner described; but as continuous testing for several hours would be likely to tire the operator's eyes and to diminish the efficiency of the work done, it would be desirable to arrange that after testing for say two or three hours, the operator should take up some other duty, such as grading or packing for a short time.

The size of the air space which forms at the larger end of an egg is the surest guide as to its age and condition. If an egg is kept in a warm place, the air space in it will increase in size more rapidly than if it is kept in a cool one, but under ordinary conditions of weather in Ireland the air space in an egg which has been kept in a suitable place will not exceed the area of a threepenny piece when the egg is four days old. In exceptional instances the air space in new laid eggs may be larger, but if the air space exceeds in area the size of a sixpenny piece the egg should not be regarded as "new laid"; and if the air space exceeds the size of a halfpenny or is more than one inch in its greatest width it should be regarded as "stale."

When an egg is fresh and in good condition the white is bright and clear, and the yolk is in the centre.

An egg should be rejected as bad and unsuitable for human consumption if on examination in a bright beam it presents any of the following appearances:—

1. If it is opaque or black;
2. If the white is dull and cloudy, and the yolk cannot be distinguished: this usually indicates a broken or spread yolk, and the egg is known as "spent";
3. If the yolk is anywhere in contact with the shell, under which condition an egg is described as "sided." Contact is denoted by a spot on the inner side of the shell, and also by the fact that when the egg is turned the yolk remains adhering to the shell;
4. If it contains large blood spots, or has spots under the shells caused by dampness.

The method of testing eggs by placing them over a bright light on perforated trays, made to carry 120 eggs, will at once indicate a black or rotten egg, but as neither the size of the air space nor the position of the yolk can be readily ascertained by this means it does not afford any reliable indication as to the age of the egg, which can only be found by noting the size of the air space, as above described.



It is obvious from what has been already stated that the cost of testing eggs singly in a beam of bright light would usually not exceed one halfpenny per 120.

If the existing marketing customs do not admit of testing eggs before they are packed, owing to the limited time available, the marketing arrangements should be altered to permit of testing. There does not appear to be any reason why shippers should not insist that dealers from whom they obtain supplies, should test their eggs, and sell subject to agreed conditions as to age as indicated by the size of the air space.

A suitable double-burner oil lamp with a cylindrical shade fitted with two testing apertures can be purchased for about 8s. 6d. In large establishments a set of testing lamps could be used, whether the light is provided by means of oil, gas, or electricity.

Egg testing on the lines recommended is carried out by some Irish shippers, including firms whose transactions are amongst the largest. There is no sufficient reason why the system should not be adopted universally.

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## I.—TECHNICAL INSTRUCTION.

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DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET,  
DUBLIN, *December, 1915.*

No. T. 12781-15.

SIR or MADAM,

I have to acquaint you that, in consequence of the financial circumstances imposed upon them in connection with the War, the Department are obliged to suspend temporarily certain of their operations, and I have therefore to direct the careful attention of Technical Instruction Committees, School Managers and Teachers to the following :—

### PROGRAMME FOR TECHNICAL SCHOOLS AND CLASSES.

Section III. of the Programme for Technical Schools and Classes, which makes provision for special classes in the subjects of the Programme, for Teachers of Primary and Secondary Schools will be suspended for the year 1916. Classes which have already been accepted under the terms of this Section for the present session will, however, continue to be recognised for grants up to the 29th February, 1916, inclusive.

### SUMMER COURSES.

The Department will not conduct any Summer Courses of Instruction for Teachers in 1916.

## EXAMINATIONS.

The next Examination in the Principles, Methods and History of Education, with special reference to Science Teaching, and the next Special Examination for Teachers' Qualifications in Manual Training (Woodwork), will not be held until 1917.

I am,

Sir or Madam,

Your obedient Servant,

T. P. GILL,

*Secretary.*

Circular 93.

T.I.B.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET,  
DUBLIN, *January, 1916.*

## PRODUCTIVE THRIFT.

To the Secretary,

Technical Instruction Committee.

SIR,

Conjointly with the movement through the County Committees of Agriculture for increasing the home-grown food supply, the Technical Instruction Committees have their special sphere in which they can help the country at the present crisis, and some have already been taking useful action.

The Committees are aware that through their organisation and teaching staff, and especially in connection with the Domestic Economy section of their work, they have a powerful means of spreading ideas and inculcating systematic practice in Thrift and in the use in the household economy of home-grown materials and home-produced goods in place of imported articles.

The Department desire to urge the Technical Instruction Committees to make further special and extra efforts at present to use their opportunities in this direction. A leaflet is forwarded with this letter containing some plain observations, suggestions, recipes, etc., designed to help the Committees in doing so.

The needs and advantages of Thrift at any time, and especially in the present crisis, are sufficiently obvious, and do not need particular emphasis; and Thrift is an essential part of the teaching of Domestic Economy. But the point which the Department think is most effective to impress at the present time is this—that, by the double process of method, waste-avoidance and saving in the household on the one hand, and on the other hand of the substitution as far as practicable of home for foreign produce in what they consume, the Irish people will be executing an important operation in economic strategy, so to speak. They will not only be helping to defend themselves against the hard times after the war, but they

will be helping to put their agriculture and industries on a sounder basis than that on which they stand to-day.

Of the foodstuffs for man and beast which Ireland imports annually, there are at least £16,000,000 worth which she could produce herself from her own soil. Of the goods of other kinds which she annually imports, there are at least another £20,000,000 worth, the production of which is natural to her conditions, and which should and ought be manufactured at home. In proportion as the Irish consumers of all kinds replace in their dietary and in the feeding of their live stock and in their other requirements Irish foodstuffs and Irish clothes, drapery, boots, leather goods, soap, candles, paper, and so forth, instead of foreign articles, in that proportion they are keeping that £36,000,000 at home as capital for their future economic development. When they simplify and systematise their domestic economy so that they are able to save on their expenditure and invest the saving in the War Loan at a high rate of interest, or even in a bank or in the Post Office, they are securing themselves individually against the lean years, and are helping the State, by means of the gold kept at home and the productive industry developed, to regulate the national finances, to steady trade, to equalise burdens, and to keep the prices of the necessities of life from rising unduly. Consumers and producers, farmers, manufacturers, and the woman in the home, Technical Instruction Committees and Agricultural Committees, all have to play a part in this matter which is at once both a critical need and a great opportunity. Viewed in this light, it will be seen that the movement is not one for a merely negative, though necessary, frugality in living, but for what may be justly styled Productive or Constructive Thrift.

In this light the Department think the Technical Instruction Committees will most usefully present the movement in their teaching. Their Commercial Instructors, as well as their Domestic Economy teachers, should be brought into the work, and the Committees should themselves confer and arrange conferences in their districts with a view to thinking out effective ways of illustrating their teaching, and useful methods of getting it into practical operation.

An example of what is meant by such illustrations may be taken from the dietary. Our dietary for the greater portion of our population has within the last thirty years become very unsuitable, and unduly expensive. There is an excessive use of tea, of white bread made from patent flour, from which some of the nutritive elements have been extracted, and, amongst the classes who can afford it, a greater use of meat, especially of imported meat, than is wholesome. If instead of that dietary there were a much larger use of vegetable and garden produce, oatmeal, wholemeal flour, vegetables in greater variety, cheese and milk, the health of the people would enormously improve, and this result would be secured at a great saving upon the cost of the existing dietary. It has been estimated by competent authorities after the most searching experiments carried out in different countries, that there is as much nutrition and food energy furnished by—taking the present prices ruling in Ireland—4½d. worth of oatmeal or 1s. 9d. worth of cheese as there is by 5s. 10d. worth of beef (see Professor Thompson's "Food Values"). The economy here is evident; but the further bearing of the matter on Irish conditions may be indicated.

It is certain that in the period of unemployment and depression after the war the industrial classes in Great Britain will be able to buy less meat and will have to go in more for such foods as cereals, cheese and vegetables. It is a natural deduction from this state of things that in the British market, which is the chief purchaser of Ireland's agricultural output, the Irish farmer must encounter a decline in the demand for his beef, and an increase in the demand for his oats, his roots, his tillage and dairy produce. Thus the Irish farmer who puts more land under tillage this year, as the Department is urging him to do, will not only be doing a good public service during the war, and aims at feeding his family and his stock as far as possible off the farm, but will be preparing himself for the situation which is to follow the war. Similarly, the Irish consumer who introduces more of this class of food into his dietary will not only be doing himself a very good service both in health and in pocket, but will be encouraging the Irish farmer in his transition to sounder methods. It all works in together towards protecting the country against economic danger and advancing her upon a line of policy which is not merely called for by the present emergency, but which has long been advised by the Department as the true road of her agricultural and industrial welfare.

Other illustrations of this view of the War Thrift and Home Food Production movement will occur to the Technical Instruction Committee and their staffs.

The Department suggest that the Committees might adopt some of the following amongst other courses of action:—Summon public meetings in their districts for the discussion of the whole subject, and through this means arouse a lively general interest in their programme; arrange for conferences with housewives and consider the forming of committees to work with them, for example, a Housewives' War-Thrift Committee; organise series of special lecture demonstrations by the Domestic Economy Instructresses as distinct from their regular class teaching; have their Commercial Instructors prepare papers or lectures for public conferences dealing with different aspects of the problem in ways calculated to quicken interest; enlist the co-operation of local citizens who might be willing to help in similar ways, for instance, a local medical man who might give a lecture on food values; consider the use of the gardens attached to houses and cottages in the towns, and whether ways might not be found of improving their productiveness; consider the encouragement of voluntarily arranged schemes of small allotments near towns for artisans, such as those which are already in operation in some towns in Ireland as well as in Great Britain, and which are found a most useful and attractive means of enhancing the local food supply; consider whether the local marketing arrangements are susceptible of improvement with a view to facilitating householders in getting their supply of home-grown produce from the farms of the surrounding districts. In considering such matters as the three latter items, the Technical Instruction Committee might consult with the Agricultural Committee of their County, who might be able to furnish them with co-operation or advice from some of their agricultural or horticultural staff.

These suggestions are thrown out by the Department for the consideration of the Committees, who must be guided by the conditions of their locality in each case. The accompanying leaflet

on "Productive Thrift," and the economical cookery recipes attached to it, will furnish further suggestions as well as materials for adapting the syllabus of Domestic Economy instruction to the requirements of the occasion.

The Department will welcome suggestions, which may come properly within the scope of their schemes, from the Committees themselves, and they will gladly support them with such assistance as may be within their power.

They are confident the Technical Instruction Committees and their staffs will take up this opportunity of service in the national emergency with zeal and enthusiasm.

I am, Sir,

Your obedient Servant,

T. P. GILL,  
*Secretary.*

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FORM S. 125.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET, DUBLIN.

### TECHNICAL SCHOOL EXAMINATIONS, 1916.

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#### GENERAL REGULATIONS GOVERNING THE CONDUCT OF THE EXAMINATIONS.

(1) The Department's Scheme of Technical School Examinations is designed to follow courses of instruction extending over four years in the following branches of technical knowledge:—

Commerce.  
Building Trades.  
Applied Chemistry.  
Electrical Engineering.  
Mechanical Engineering.  
Domestic Economy.  
Art.

There will be, in general, two examinations in each Course in each of the four years, and the examinations in each Course must be taken in the order prescribed. The Department will not concern themselves with the examination of candidates other than those intending to take out a Course Certificate, except in the case of candidates who wish to obtain one of the Certificates for Teachers of Drawing and Art referred to in Form S. 240.

For the examination in Commercial Geography of the Honours' Examination of the Courses in Commerce, the intensive study of the Commercial Geography of a given region is specified, and will be varied from year to year. That for 1916 will be Switzerland.

(2) Examinations in all subjects of the Courses will be held in

1916. Candidates will, for the present, be allowed to take the First and Second Year Examinations in the same year; candidates who obtained a success in any one subject of the Second or Third Year of a Course (except an Art Course) in previous years, may take the remaining subject of that Year in 1916 together with the examinations of the next year of the Course; candidates for the Third or Fourth Year Examinations of the Courses in Art must have passed in previous years in at least two subjects of the Second or Third Year respectively; candidates for the Honours' Examination in a Course must have passed in at least one subject of the Fourth Year of the Course in a previous year; but it must be understood that no candidate can obtain credit for the examinations of any Year unless he shall have passed all the preceding examinations in the Course.

(3) The Examinations will be held in MAY. The dates on which the Examinations in the various subjects will be held are specified in the Examination Time Table, published separately.

(4) The Syllabuses of the subjects are set out in the Programme of Technical School Examinations (price 2d., postage extra). The Syllabuses for the Honours examinations have been published as a supplement to the Programme (copies are issued free of charge with the Programme). Copies of the Examination Papers set in previous years and of the Examiners' Reports have been published in book form. These publications may be obtained directly, or through any bookseller, from E. Ponsonby, Limited, 116 Grafton Street, Dublin.

(5) Certificates will not be issued by the Department in respect of the First and Second Year Examinations of any Course. Pass Lists will, however, be issued to the local School Authorities. A "Provisional Certificate" will be issued on the passing of a Third Year Examination (the candidate having already passed in the examinations prescribed for the First and Second Years), and a "Full Course Certificate" on the passing of the Fourth Year Examination, the latter certificate to have stated upon it the subjects taken in the Course and the Class of success (First or Second) obtained. It is further proposed to issue a "Full Course Honours Certificate" to candidates who pass the further examinations specified in certain Courses.

(6) It is intended that the courses of instruction of which these examinations will provide a test, should include not only theoretical, but practical and laboratory work. In the examinations in Chemical Analysis (*Third Year*) and Technical Analysis (*Fourth Year and Honours*), credit will be given for records of work done by candidates, and their laboratory note-books, signed and certified by the teacher, must be retained and made available for examination.

In addition to the theoretical examinations in the Syllabuses prescribed in certain Science subjects (see Programme), candidates will be required to furnish evidence that they have followed a satisfactory course of practical work. Laboratory note books will be accepted as evidence of this, and Local Secretaries will be required to forward to the Department at their offices at the Industrial Annexe, Grand Canal Bank, Harcourt Terrace, Dublin, within 7 days after the examination, the laboratory note books of the candidates who take each of the following examinations:—

### *Courses in Applied Chemistry.*

First Year : Elementary Physics.  
 First Year : Elementary Chemistry.  
 Second Year : Inorganic Chemistry.  
 Second Year : Chemical Analysis.  
 Third Year : Inorganic and Organic Chemistry.  
 Fourth Year : Organic Chemistry.  
 Honours : Organic Chemistry.

### *Courses in Electrical Engineering.*

First Year : Electrical Engineering.  
 Second Year : Electrical Engineering.  
 Third Year : Electrical Engineering.  
 Third Year : Electrical Testing.

Candidates taking any of the examinations in Design of the Fourth Year of the Courses in Art are required to submit testimonies of study, to consist of note books and sketches with actual specimens from original designs carried out during the preceding year. Photographs of sketches will be accepted in the case of specimens which have been disposed of, or which cannot otherwise be submitted. These testimonies should be furnished by the 1ST JUNE, 1916.

In no case will a candidate be awarded a pass who fails to submit satisfactory note books or testimonies of study.

Local Secretaries must ascertain, and furnish to the Department by 1st April, 1916, particulars of the special work selected by each candidate for investigation in connection with the tests in Technical Analysis (*Fourth Year and Honours*—Courses in Applied Chemistry). In the case of examinations in Workshop Practice (*Third and Fourth Years*—Course B: Mechanical Engineering), Local Secretaries must submit on behalf of the candidates by 1st April, 1916, syllabuses of the course followed in this subject.

(7) The practical tests in the Courses in Applied Chemistry, and in the Third and Fourth Years' Examinations in Mechanical Engineering and Domestic Economy, can only be held in Laboratories or Class-rooms recognised by the Department for the purpose. Schools will, subject to these regulations, be constituted centres for practical or personal examinations only on the understanding that the Managers are prepared to make such special arrangements as will be necessary for these examinations.

### APPLICATIONS FOR EXAMINATION PAPERS.

(8) Managers who wish their Schools to be made Examination Centres must make application for Examination Papers, on Form S. 102, not later than the 18th March. On this Form the Managers will also be required to propose arrangements for the examinations.

### FEES FOR EXAMINATION PAPERS.

(9) An examination fee of 1s. 6d. will be payable by candidates in the First, Second, Third and Fourth Years of the Courses for each subject of examination prescribed when held by the Department. A fee of 3s. is exigible in respect of each of the three subjects prescribed for the Honours examination in Commerce, and of 5s. for

each of the two subjects of the Honours examination in Applied Chemistry held by the Department. When the examinations of the City and Guilds of London Institute are prescribed the fee chargeable by that body will be payable by the candidates.

(10) The remittance of the fee for examination papers must be made by Bank Draft, Cheque, or Postal Order, payable to "The Accountant, Department of Agriculture and Technical Instruction for Ireland." *Stamps cannot be accepted.*

#### ADMISSION OF EXTERNAL CANDIDATES.

(11) External candidates (i.e., candidates who are not students of a School which is to be an examination centre) must apply not later than 10th March to the Managers of the School where examinations in the subjects required will be held.

#### FEES FOR EXTERNAL CANDIDATES.

(12) Managers may charge external candidates a fee not exceeding 2s. 6d. for each evening for which they register their names for examination. The admission of external candidates to examinations in Chemical Analysis, Technical Analysis, Engineering Workshop Practice, Domestic Economy (Practical Tests), and Modelling, is not obligatory, and the above-mentioned limitation to the fee will not apply in the case of admission to the examinations in these subjects. These fees are additional to the fees payable to the Department.

#### CANDIDATES ELIGIBLE FOR EXAMINATION.

(13) Though the Examinations are based upon the knowledge which may be acquired in following a definite course of instruction in a Technical School, the Department will not, for the present, require attendance at a Technical School as a qualification for admission to these examinations.

#### AWARDS OF MEDALS AND PRIZES.

(14) The regulations for the award of Medals and Prizes by the Department under the Programme of Technical School Examinations have been published separately. Copies may be had upon application to the Department's Offices.

#### CONJOINT EXAMINATIONS OF TWO OR MORE SCHOOLS.

(15) Where Managers of different Institutions have classes in the same subject under their control they must arrange, where possible, for a conjoint examination of these classes in such a manner that an unnecessary number of rooms may not be in use.

#### SEPARATE EXAMINATIONS NOT HELD FOR LESS THAN FOUR CANDIDATES.

(16) A separate examination will not, as a rule, be held where the number of candidates to be presented on any one evening is less than four, but the Department will be prepared, in exceptional circumstances, to approve of examinations being held for a fewer number of candidates, if special written application, setting forth the circumstances, is made not later than the 29th February.



## SEATING ARRANGEMENTS.

(17) The accommodation provided must be sufficient to permit of the candidates being so seated that no candidate may be able to overlook the work of another candidate in the same subject, and that candidates may not be able to afford assistance to one another. With the exception of the examinations in Object and Memory Drawing, Drawing from Casts, and Drawing from Natural Forms, the candidates must be seated not less than five feet apart. At the examinations in these Art Subjects candidates may be placed so as to be not less than two feet six inches apart. It is desirable that rooms with level floors and without galleries should be used.

## SUPPLY OF EXAMINATION REQUISITES.

(18) Managers or their representatives must provide (for use in the examinations in those subjects in which they are required) ink, pens, ruled foolscap paper, paper fasteners, tracing paper, and the necessary materials required for examinations in certain Art Subjects, such as, e.g., stands, nails, etc., for hanging up casts; clay and plaster for modelling; etc.

## DESPATCH OF EXAMINATION PAPERS AND OF EXAMINATION MATERIALS.

(19) The examination papers and the materials supplied by the Department for the examinations will, as a rule, be forwarded to the Examination Secretary, but if the Examination Secretary is ineligible to act as Superintendent (see Section 21 below), the Managers must appoint some other responsible person to act as Custodian of Examination Papers.

(20) The packets of examination papers must not, under any circumstances, be permitted to pass into the hands of a teacher, of a candidate for examination, or of any other person interested in the success of the candidates.

## NOMINATION OF SUPERINTENDENTS.

(21) The Managers will nominate, on Form S. 107, certain persons prepared to superintend the examinations. The Superintendents may either be voluntary Superintendents, or they may be remunerated by the Managers, after notice to the Department, at a rate not exceeding 2s. 6d. per hour of attendance necessary; the Department would not, however, approve of Managers making payments for such services to members of their own body. Candidates for examination, their relatives, their teachers, or other persons who have a direct interest in the success of any candidate, are ineligible to act as Superintendents of Examinations. Managers are held entirely responsible for the presence of Superintendents to the number required at each examination; otherwise the examination may be held to be void. Copies of Form S. 107 will be issued in due course to the Managers of all Centres whose applications (on Form S. 102) for examination papers have been accepted.

## DETAILED INSTRUCTIONS SENT TO SECRETARY.

(22) Detailed Instructions for the conduct of the examinations will be addressed in due course to each Examination Secretary.

### CARDS OF ADMISSION TO EXAMINATION.

(23) The Department do not issue cards of admission for the use of candidates, but it is desirable that such cards should be prepared and issued by the Managers of the Examination Centres.

### PENALTIES FOR INFRINGEMENT OF REGULATIONS.

(24) The Department may disallow examinations which afford evidence of not having been conducted in strict accordance with the Regulations; they will investigate cases of suspected irregularity, and may require any or all of the candidates to be re-examined. If any candidate should fail to appear at such investigation, or decline to be re-examined, all his previous examinations may be cancelled. When an examination has failed through no fault of the candidates, a re-examination may be allowed, the cost of which may be charged to the Managers. A re-examination will not be accepted for the purposes of the award of Scholarships, Prizes, etc.

### DEPARTMENT NOT RESPONSIBLE FOR ERRORS.

(25) All possible care is taken that the examination papers may be forwarded in accordance with the applications, and that the results may be issued correctly, but the Department cannot undertake to rectify mistakes, nor will they be responsible for any incidental loss.

### EXAMINATIONS OF CITY AND GUILDS OF LONDON INSTITUTE.

(26) The Department do not undertake to make any arrangements for the examination of candidates taking the examinations of the City and Guilds of London Institute prescribed in connection with certain of the Courses. Such arrangements must be made by the candidates with the Institute through the Managers of an Examination Centre.

The Department have, however, arranged with the Institute that Candidates in Electrical Engineering (*Course A—Fourth Year*) may be presented for the Institute's Examination in Grade II. of that subject without having previously passed in Grade I. This concession applies only to candidates who have completed the Third Year's Examination of the Course as set out in the Department's Programme. It has also been arranged that candidates in Mechanical Engineering may enter for the Institute's Final Examination in that subject without having passed in Grades I. or II., if they have passed the Fourth Year Examination of the Courses in Mechanical Engineering of the Department's Programme.

The names (in full) and dates of birth of candidates who desire exemption in 1916 from the Grade I. Examination in Electrical Engineering, or the Grade I. or Grade II. Examination in Mechanical Engineering of the Institute should be forwarded by the Local Secretary so as to reach the offices of the Department on or before the 29th February.

### SPECIAL EXAMINATIONS FOR ART TEACHING CERTIFICATES.

(27) Special Examinations in Geometrical Drawing, Perspective, and Methods of Teaching Drawing, in connection with the award of Teachers' Certificates in Art under the conditions of Form S. 240, will be held in May. The regulations governing the conduct of these examinations will, in general, be as set forth above.

### III.—TRANSIT AND MARKETS.

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(Twelfth List).

#### DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

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#### BUTTER AND MARGARINE ACT, 1907.

(Sections 8 and 14 (1)).

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#### LIST OF NAMES APPROVED BY THE DEPARTMENT FOR USE IN CONNECTION WITH MARGARINE.

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NOTE.—Approval by the Department authorises the use of the name in Ireland only. Approval does not confer on any person any exclusive right to the use of the name, nor authorise its use by any person not entitled to use it.

Acacia	Kingfisher.
Bannano.	Liptona.
Banola.	Maiferne.
Banolene	Mermaid.
Blue Arrow.	Planters Pride.
Blue Banner.	Red Banner.
Bu-Na.	Red Shield.
Estate.	Silvercloud.
Foxglove.	Silver Crest.
Glad Eye.	Silver Lining.
Golden Crest.	Sunburst.
Green Banner.	Sunshine.
Honeyco.	Welcome.
Honeymar.	

OFFICES, 4 UPPER MERRION STREET,  
DUBLIN, 31st December, 1915.

## NOTES AND MEMORANDA.

A meeting of the Agricultural Board was held at the Offices of the Department, 4 Upper Merrion Street, on Wednesday, 17th November, 1915. The following attended :—

The Right Hon. T. W. Russell, M.P., Vice-President of the Department (in the Chair); Mr. John Bourke, Mr. Meeting of the Alexander L. Clark, J.P.; Very Rev. Canon Daly, Agricultural D.D., P.P.; Mr. Robert Downes; Col. Sir N. T. Board. Everard, Bart., H.M.L.; Sir Josslyn Gore-Booth, Bart., D.L.; Mr. John S. F. M'Cance, J.P.; Mr. George Murnaghan, J.P.; Mr. John D. O'Farrell; Mr. Patrick J. O'Neill, J.P.

Mr. T. P. Gill, Secretary of the Department; Mr. J. R. Campbell, B.Sc., Assistant Secretary in respect of Agriculture; Mr. J. S. Gordon, B.Sc., Deputy Assistant Secretary in respect of Agriculture and Chief Agricultural Inspector; Mr. H. G. Smith, M.A., LL.D., Chief Clerk; Mr. J. P. Walsh, Clerk in Charge of Accounts; Mr. J. V. Coyle, B.L., Senior Staff Officer, and Mr. F. J. Meyrick, M.A., were also present.

Mr. J. V. Coyle acted as Secretary to the Meeting.

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A meeting of the Board of Technical Instruction was held at the Offices of the Department, 4 Upper Merrion Street, on the 18th November, 1915. The following members attended :—

The Right Hon. T. W. Russell, M.P., Vice-President of the Department (in the Chair); Mr. Andrew Beattie, Meeting of the J.P., D.L.; Rev. Henry Evans, D.D., M.R.I.A., Board of F.I.H.; Rev. T. A. Finlay, M.A.; Sir John Barr Technical Johnston, J.P.; Mr. William Macartney, J.P.; Instruction. Mr. Patrick Mahon; Mr. Francis McBride, J.P.; Alderman Samuel T. Mercier, J.P.; Alderman W. J. Moore, J.P.; Mr. Seaghan T. O Ceallaigh, Right Worshipful Alderman Philip O'Donovan, Mayor of Limerick; Mr. Richard Sisk; Mr. Alexander Taylor.

Mr. T. P. Gill, Secretary of the Department; Mr. George Fletcher, F.G.S., Assistant Secretary in respect of Technical Instruction; Mr. H. G. Smith, M.A., LL.D., Chief Clerk; Mr. J. V. Coyle, B.L., Senior Staff Officer; and Mr. A. Kelly were also present.

Mr. J. V. Coyle acted as Secretary to the Meeting.

The following Resolution was adopted unanimously on the motion of Alderman S. T. Mercier, J.P., Belfast, seconded by Mr. Richard Sisk, Cork :—

“That the Board of Technical Instruction learn with the deepest regret of the death of the Most Reverend Richard A. Sheehan, D.D., Lord Bishop of Waterford and Lismore, who, as representing the County Borough of Waterford, has been a valued colleague since the year 1908. Not only was His Lordship of the greatest service by his labours in connection with the Board but as Chairman of the Technical Instruction Committee of the County Borough of Waterford he forwarded in a very marked degree the progress of technical instruction in that city.

“The Board desire to place on record their appreciation of the wide and accurate knowledge which His Lordship possessed on the subject of educational finance—a knowledge which he never failed to place at the disposal of the Department and the country—and their deep consciousness of the loss which the Board, the Department and the country have suffered by his death.”

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The statements showing the produce of the various crops in Ireland which are compiled annually by the  
**Produce of** Statistics and Intelligence Branch of the De-  
**the Crops.** partment of Agriculture and Technical Instruction  
 for Ireland have been issued for the year 1915.

The returns dealing with the Grain, Potato, Root and Cabbage, and Flax Crops are summarised below.

In 1915 there has been an increase of 49,617 acres in the area of wheat, an increase of 59,906 acres in the area of  
**Grain Crops.** oats, a decrease of 30,708 acres in the area of barley, a decrease of 95 acres in the area of rye, a decrease of 204 acres in the area of beans, and a decrease of 92 acres in the area of pease. The total estimated yield of wheat in 1915 is 1,734,407 cwts., an increase of 976,253 cwts. as compared with 1914; of oats 19,601,117 cwts., an increase of 1,519,156 cwts.; of barley 2,522,084 cwts., a decrease of 937,934 cwts.; of rye 108,873 cwts., a decrease of 2,050 cwts.; of beans 22,019 cwts., a decrease of 7,760 cwts.; and of pease 3,030 cwts., a decrease of 1,534 cwts.

The average yield of the potato crop in Ireland in 1915 is estimated at 6·2 tons per statute acre as against

**Potato Crop.** 5·9 tons in 1914 and 5·2 tons for the ten-year period—1905–1914. The acreage of the crop in 1915 amounted to 594,467 acres as against 583,069 acres in 1914,

an increase of 11,398 acres. The total produce of the crop in 1915 is estimated at 3,710,063 tons as against 3,445,770 tons in 1914.

The average rate for the province of Leinster is 5.5 tons per statute acre in 1915, and is the same as it was in 1914. In Munster the average is 5.6 tons in 1915 as against 5.3 tons in 1914. In Ulster the average is 6.9 tons in 1915 as against 6.4 tons in 1914. In Connaught the yield is 6.3 tons in 1915 as against 6.0 tons in 1914.

The total production of turnips in Ireland in 1915 was 5,091,034 tons, being an increase of 657,543 tons as compared with 1914; the area in 1915 shows a decrease of 11,750 acres. The produce of mangels amounts to 1,806,849 tons in 1915, an increase of 244,775 tons as compared with 1914; the area shows an increase of 1,158 acres. Carrots show a total yield of 13,166 tons, a decrease of 345 tons; while there is a decrease in the area of 62 acres. The yield of parsnips amounts to 7,094 tons, an increase of 54 tons, in comparison with 1914; the area decreased by 5 acres. Cabbage shows a total yield of 460,779 tons, being an increase of 10,938 tons as compared with 1914; the area increased by 231 acres.

The total produce of the flax crop in 1915 is estimated at 1,546,267 stones as against 1,300,128 stones in 1914, an increase of 246,139 stones, while the area showed an increase of 3,890 acres.

The yield per acre of the flax crop this season exceeds the returns obtained in 1914. The average production of fibre works out at 29.1 stones per statute acre as compared with 26.4 stones in 1914, and was 2.6 stones below the average of 31.7 stones for the ten years 1905-14. The crop was sown rather late owing to unfavourable weather and the difficulty of obtaining seed. Yields, though far from uniform, proved to be better than were expected. Last year's high rate of prices has been considerably exceeded.

## STATISTICAL

## FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast. *(Erris Head to Torr Head).				East Coast. (Torr Head to Carnsore Point).			
	1915.		1914.		1915.		1914.	
	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, . . . . .	12	21	4	8	6	29	14	33
Soles, . . . . .	18	81	17	70	46	257	60	287
Turbot, . . . . .	4	16	4	11	19	103	29	136
Total Prime Fish, . .	34	118	25	89	71	389	103	456
Cod, . . . . .	42	32	68	41	345	659	899	1,098
Conger Eel, . . . . .	3	4	6	3	163	203	662	365
Haddock, . . . . .	11	9	38	19	37	36	53	74
Hake, . . . . .	—	—	—	—	210	473	393	520
Herrings, . . . . .	25,323	8,665	6,588	2,016	4,956	2,150	6,809	1,878
Ling, . . . . .	—	—	—	—	26	24	102	62
Mackerel, . . . . .	52	27	89	42	355	168	54	16
Plaice, . . . . .	205	207	149	139	507	851	788	1,096
Ray or Skate, . . . .	172	43	148	37	198	142	708	314
Sprats, . . . . .	—	—	—	—	—	—	—	—
Whiting, . . . . .	11	7	35	16	621	904	404	422
All other except Shell Fish	66	26	168	54	658	571	737	487
Total, . . . . .	25,919	9,138	7,314	2,456	8,147	6,570	11,762	6,798
SHELL FISH:— . . . .	No.		No.		No.		No.	
Crabs, . . . . .	524	6	300	3	—	—	910	8
Lobsters, . . . . .	2,876	98	2,652	62	3,436	115	4,803	125
Mussels, . . . . .	—	—	200	15	460	69	—	—
Oysters, . . . . .	No.	—	No.	—	No.	—	No.	6
Other Shell Fish, . .	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
	50	9	75	8	52	31	81	38
Total, . . . . .	—	113	—	88	—	215	—	177
Total value of Fish landed	—	9,251	—	2,544	—	6,785	—	6,975

NOTE—The above figures are subject  
\*In monthly returns previous to and including December, 1914, the extent of each of the  
Coast—Torr Head to Carnsore Point; South Coast—Carnsore

## TABLES.

## IRELAND.

as landed on the IRISH COASTS during the month of October, 1915, as corresponding period in 1914.

South Coast. (Carnsore Point to Loop Head).				West Coast. (Loop Head to Erris Head).				Total.			
1915.		1914.		1915.		1914.		1915.		1914.	
Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
9	18	19	38	—	—	—	—	27	68	37	79
35	168	47	207	34	118	22	69	133	624	146	633
9	34	12	50	12	63	14	64	44	216	59	261
53	220	78	295	46	181	36	133	204	908	242	973
2	5	5	4	—	—	—	—	389	696	972	1,143
3	1	2	1	—	—	—	—	169	208	670	369
—	—	—	—	—	—	6	2	48	45	97	95
1	1	9	9	—	—	—	—	211	474	402	529
1,317	666	1,719	658	3,896	2,561	3,331	1,196	35,492	14,042	18,447	5,748
—	—	—	—	—	—	—	—	26	24	102	62
10,202	7,411	17,414	7,090	2,024	1,246	4,604	1,556	12,633	8,852	22,161	8,704
165	206	156	177	17	20	89	73	894	1,284	1,182	1,485
56	18	137	19	28	14	—	—	454	217	993	370
8	3	10	2	—	—	—	—	8	3	10	2
5	5	9	7	26	7	186	129	663	923	634	584
120	73	267	137	279	142	227	156	1,123	812	1,449	834
11,932	8,609	19,806	8,399	6,316	4,171	8,479	3,245	52,314	28,488	47,361	20,898
No.	—	No.	—	No.	—	No.	—	No.	6	No.	1,210
1,356	46	724	26	2,724	116	1,374	42	10,392	375	9,553	255
Cwt.	—	Cwt.	1,573	Cwt.	144	Cwt.	—	Cwt.	81	Cwt.	1,773
—	—	—	235	—	12	—	—	604	—	—	250
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
35,280	57	34,020	68	14,160	30	13,440	28	49,440	87	52,500	102
Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
153	19	289	82	598	114	644	99	853	173	1,089	227
—	122	—	411	—	272	—	169	—	722	—	845
—	8,731	—	8,810	—	4,443	—	3,414	—	29,210	—	21,743

to correction in Annual Returns.  
Coasts referred to therein was as follows :—North Coast—Rossan Point to Torr Head; East Point to Kenmare; West Coast—Kenmare to Rossan Point.



## FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish,	North Coast. *(Erris Head to Torr Head.)				East Coast; (Torr Head to Carnsore Point.)			
	1915.		1914.		1915.		1914.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, . . . . .	1	1	—	—	6	25	8	18
Soles, . . . . .	4	22	3	15	35	213	42	187
Turbot, . . . . .	—	—	1	2	21	109	18	82
Total Prime Fish, .	5	23	4	17	62	347	68	287
Cod, . . . . .	106	100	99	75	335	704	409	611
Conger Eel, . . . .	27	26	—	—	164	195	208	166
Haddock, . . . . .	56	41	30	23	67	68	70	76
Hake, . . . . .	—	—	—	—	284	620	190	283
Herrings, . . . . .	2,658	1,197	343	120	12,743	3,850	2,711	1,499
Ling, . . . . .	—	—	—	—	40	41	50	49
Mackerel, . . . . .	125	147	52	23	2	1	—	—
Plaice, . . . . .	69	74	49	48	312	626	856	895
Ray or Skate, . . .	183	54	154	39	138	119	298	193
Sprats, . . . . .	—	—	—	—	—	—	—	—
Whiting, . . . . .	59	39	8	5	883	1,131	334	344
All other except Shell Fish	83	115	115	20	715	748	455	365
Total, . . . . .	3,371	1,816	854	370	15,745	8,450	5,649	4,768
SHELL FISH :—	No.	—	No.	—	No.	—	No.	—
Crabs, . . . . .	—	—	—	—	—	—	—	—
Lobsters, . . . . .	348	8	1,002	21	3,293	121	4,081	125
Mussels, . . . . .	—	—	104	9	—	—	5	1
Oysters, . . . . .	—	—	—	—	—	—	—	—
Other Shell Fish, .	Cwt. 20	2	Cwt. 20	2	Cwt. 39	22	Cwt. 44	25
Total, . . . . .	—	10	—	32	—	143	—	151
Total value of Fish landed	—	1,826	—	402	—	8,593	—	4,919

NOTE.—The above figures are subject

\* In monthly returns previous to and including December, 1914, the extent of each Torr Head; East Coast—Torr Head to Carnsore Point; South Coast—

## IRELAND.

as Landed on the Irish Coasts during the month of November, 1915, as corresponding period in 1914.

South Coast. (Carnsore Point to Loop Head.)				West Coast. (Loop Head to Erris Head.)				Total.			
1915.		1914.		1915.		1914.		1915.		1914.	
Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value	Quan- tity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
8	18	14	28	—	—	—	—	15	44	22	46
25	120	30	126	20	78	27	106	84	433	102	434
7	31	7	29	13	67	14	64	41	207	40	177
40	169	51	183	33	145	41	170	140	684	164	657
47	74	9	8	2	1	12	12	490	879	529	706
—	—	—	—	91	69	86	45	282	290	294	211
1	1	—	—	4	11	44	39	128	121	144	138
6	6	—	—	—	—	—	—	290	626	190	283
957	526	142	84	682	401	131	56	17,040	5,974	3,327	1,759
9	9	—	—	3	3	4	2	52	53	54	51
6,088	5,100	20,002	7,790	594	460	2,610	1,012	6,809	5,708	22,664	8,825
119	167	100	110	16	26	41	37	516	803	1,046	1,090
64	29	110	15	116	62	25	8	501	264	587	255
147	48	12	2	—	—	—	—	147	48	12	2
32	24	7	6	66	79	128	104	1,040	1,273	477	459
50	34	106	48	65	49	70	49	913	946	746	482
7,560	6,187	20,539	8,246	1,672	1,306	3,192	1,534	28,348	17,759	30,234	14,918
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
48	2	—	—	60	2	—	—	3,749	133	5,083	146
Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
—	—	1,116	177	—	—	515	32	—	—	1,740	219
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
19,530	35	17,136	32	30,120	63	20,640	43	49,650	98	37,776	75
Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
280	140	404	99	822	183	600	120	1,161	347	1,068	246
—	177	—	308	—	248	—	195	—	578	—	686
—	6,364	—	8,554	—	1,554	—	1,729	—	18,337	—	15,604

to correction in Annual Returns.

of the Coasts referred to therein was as follows :—North Coast—Rossan Point to Carnsore Point to Kenmare ; West Coast—Kenmare to Rossan Point

## FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast, * (Erris Head to Torr Head.)				East Coast, (Torr Head to Carnsore Point.)			
	1915.		1914.		1915.		1914.	
	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, . . . . .	—	—	—	—	14	43	17	55
Soles, . . . . .	1	7	1	6	13	101	32	171
Turbot, . . . . .	—	—	1	1	9	46	13	59
Total Prime Fish, . . . . .	1	7	2	7	36	190	62	285
Cod, . . . . .	127	127	112	90	494	1,068	704	843
Conger Eel, . . . . .	17	28	—	—	120	136	130	116
Haddock, . . . . .	48	51	198	163	23	35	35	46
Hake, . . . . .	—	—	—	—	175	466	71	141
Herrings, . . . . .	625	257	108	54	23,736	11,083	12,333	5,818
Ling, . . . . .	1	1	—	—	18	19	30	23
Mackerel, . . . . .	—	—	—	—	—	—	—	—
Plaice, . . . . .	22	23	30	30	262	830	194	378
Ray or Skate, . . . . .	120	35	230	62	151	127	243	190
Sprats, . . . . .	—	—	—	—	—	—	—	—
Whiting, . . . . .	26	21	27	16	1,508	2,145	359	306
All other except Shell Fish	4	5	100	70	576	639	382	358
Total, . . . . .	991	555	807	492	27,099	16,738	14,543	8,504
SHELL FISH:— . . . . .	No.	—	No.	—	No.	—	No.	—
Crabs, . . . . .	—	—	—	—	—	—	—	—
Lobsters, . . . . .	—	—	192	5	2,003	85	1,402	54
Mussels, . . . . .	—	—	80	6	—	—	—	—
Oysters, . . . . .	No.	—	No.	—	No.	—	No.	—
Other Shell Fish, . . . . .	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
	35	4	20	2	29	17	16	9
Total, . . . . .	—	4	—	13	—	102	—	63
Total value of Fish landed	—	559	—	505	—	16,840	—	8,567

NOTE.—The above figures are subject

\* In monthly returns previous to and including December, 1914, the extent of each Head; East Coast—Torr Head to Carnsore Point; South Coast—

## IRELAND.

as landed on the IRISH COASTS during the month of December, 1915, as corresponding period in 1914.

South Coast. (Carnsore Point to Loop Head.)				West Coast. (Loop Head to Erris Head.)				Total.			
1915.		1914.		1915.		1914.		1915.		1914.	
Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
6	15	3	5	1	3	—	—	21	61	20	60
13	70	10	43	18	77	1	2	45	255	44	222
4	19	1	3	11	47	1	1	24	112	16	64
23	104	14	51	30	127	2	3	90	428	80	346
18	33	24	24	25	12	37	29	664	1,240	877	986
4	4	—	—	52	41	99	53	193	209	229	169
—	—	—	—	11	14	17	17	82	100	250	226
—	—	—	—	—	—	—	—	175	466	71	141
1,760	1,418	5,951	2,776	219	185	389	180	26,340	12,943	18,781	8,828
—	—	—	—	7	6	24	10	26	26	54	33
4,831	4,080	3,061	1,353	1,235	910	448	232	6,066	4,990	3,509	1,585
53	110	20	23	26	48	2	4	363	1,011	246	435
51	25	12	3	53	29	39	10	375	216	524	265
17	6	309	73	—	—	—	—	17	6	309	73
6	5	2	2	57	95	30	28	1,597	2,266	418	352
34	26	53	34	38	30	5	7	652	700	540	469
6,797	5,811	9,446	4,339	1,753	1,497	1,092	573	36,640	24,601	25,888	13,908
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
108	5	—	—	—	—	—	—	2,111	90	1,594	59
Cwt.	291	Cwt.	81	Cwt.	—	Cwt.	90	Cwt.	291	Cwt.	93
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
14,490	26	14,364	28	287,640	510	312,546	622	302,130	536	326,910	650
Cwt.	397	Cwt.	94	Cwt.	557	Cwt.	684	Cwt.	302	Cwt.	288
—	461	—	203	—	652	—	791	—	1,219	—	1,070
—	6,272	—	4,542	—	2,149	—	1,364	—	25,820	—	14,978

to correction in Annual Returns.

of the Coasts referred to therein was as follows : North Coast—Rossan Point to Torr Carnsore Point to Kenmare ; West Coast—Kenmare to Rossan Point.

STATEMENT of the TOTAL QUANTITY of FISH landed on the ENGLISH and WELSH COASTS during the Month and Twelve Months ended 31st December, 1915, compared with the corresponding periods of the Year 1914.

KINDS OF FISH.	December.		Twelve months ended 31st December.	
	1915.	1914.	1915.	1914.
	QUANTITY.			
	Cwt.	Cwt.	Cwt.	Cwt.
Brill, . . . . .	712	933	8,194	18,579
Soles, . . . . .	1,496	2,771	27,486	60,479
Turbot, . . . . .	1,321	1,671	22,297	55,135
Prime Fish not separately distinguished, . . . . .	—	—	—	1,107
Total Prime Fish, . . . . .	3,529	5,375	57,927	135,300
Bream, . . . . .	4,076	8,958	36,661	99,638
Catfish, . . . . .	826	2,032	49,523	148,205
Coalfish, . . . . .	3,991	4,475	157,011	409,474
Cod, . . . . .	63,944	110,379	1,361,131	2,579,101
Conger Eels, . . . . .	1,823	2,131	53,250	62,051
Dabs, . . . . .	5,602	7,496	81,509	105,785
Dogfish, . . . . .	4,757	6,963	50,627	42,120
Dory, . . . . .	24	32	624	2,046
Flounders or Flukes, . . . . .	95	225	3,083	6,803
Gurnards, . . . . .	2,930	3,294	50,700	105,520
Haddock, . . . . .	71,163	79,428	1,195,827	1,337,133
Hake, . . . . .	4,831	11,971	149,244	573,698
Halibut, . . . . .	1,286	2,146	26,041	80,967
Latchets (Tubs), . . . . .	194	142	1,302	3,005
Lemon Soles, . . . . .	842	1,248	20,716	46,330
Ling, . . . . .	2,792	3,144	56,233	183,189
Megrim, . . . . .	1,893	1,341	24,799	76,529
Monks (or Anglers), . . . . .	1,324	1,702	19,858	33,910
Mullet (Red), . . . . .	8	—	36	74
Plaice, . . . . .	17,171	20,560	227,541	562,285
Pollack, . . . . .	126	379	12,600	12,885
Skates and Rays, . . . . .	10,692	14,576	189,923	344,007
Torsk, . . . . .	121	546	9,617	26,966
Whiting, . . . . .	15,654	12,550	210,807	358,380
Witches, . . . . .	310	712	5,478	35,545
Herrings, . . . . .	66,410	50,207	1,203,985	2,016,908
Mackerel, . . . . .	359	329	259,896	276,968
Mullet (Grey), . . . . .	132	147	796	698
Pilchards, . . . . .	—	25	16,290	46,146
Sprats, . . . . .	24,225	30,789	94,262	88,167
Whitebait, . . . . .	313	296	4,043	4,346
Fish not separately distinguished, . . . . .	7,529	8,841	153,795	320,630
Total Wet Fish, . . . . .	318,972	392,439	5,785,115	10,124,809
Shell Fish :—	No.	No.	No.	No.
Crabs, . . . . .	10,186	49,846	4,301,378	4,842,199
Crawfish (Crayfish) . . . . .	—	—	26,951	28,875
Lobsters, . . . . .	1,190	3,014	388,422	585,956
Oysters, . . . . .	4,904,253	3,134,792	32,654,719	23,910,813
Other Shell Fish, . . . . .	Cwt.	Cwt.	Cwt.	Cwt.
	37,729	55,308	507,269	589,963

NOTE.—The figures for 1915 are subject to revision.

**STATEMENT of the TOTAL VALUE of FISH landed on the ENGLISH and WELSH COASTS during the Month and Twelve Months ended 31st December, 1915, compared with the corresponding periods of the Year 1914.**

KINDS OF FISH.	December.		Twelve months ended 31st December.	
	1915.	1914.	1915.	1914.
	VALUE.			
	£	£	£	£
Brill, . . . . .	4,058	4,097	37,762	62,508
Soles, . . . . .	12,253	19,799	221,889	387,911
Turbot, . . . . .	9,520	10,228	115,426	230,783
Prime Fish not separately distinguished, . . . . .	—	—	—	1,752
Total Prime Fish, . . . . .	25,831	34,124	375,077	682,954
Bream, . . . . .	3,899	4,889	30,627	35,612
Catfish, . . . . .	1,299	1,929	50,447	70,567
Coalfish, . . . . .	5,943	3,900	118,377	135,357
Cod, . . . . .	125,242	143,313	1,699,198	1,755,758
Conger Eels, . . . . .	2,606	2,024	59,795	43,611
Dabs, . . . . .	11,098	15,165	144,693	117,011
Dogfish, . . . . .	4,027	3,882	36,058	16,425
Dory, . . . . .	45	47	971	1,913
Flounders or Flukes, . . . . .	140	212	3,544	5,225
Gurnards, . . . . .	2,154	1,895	30,796	34,816
Haddock, . . . . .	147,672	107,825	1,733,869	1,167,769
Hake, . . . . .	12,381	21,726	293,335	658,132
Halibut, . . . . .	6,083	10,325	116,074	271,962
Latchets (Tubs), . . . . .	203	153	1,483	1,937
Lemon Soles, . . . . .	4,367	6,076	83,912	136,843
Ling, . . . . .	4,605	3,063	59,851	97,067
Megrims, . . . . .	4,849	2,151	44,115	71,285
Monks (or Anglers), . . . . .	1,844	1,495	20,291	21,195
Mullet (Red), . . . . .	47	—	193	239
Plaice, . . . . .	51,033	54,612	607,486	874,192
Pollack, . . . . .	206	438	12,100	9,491
Skates and Rays, . . . . .	17,463	15,042	224,710	268,205
Torsk, . . . . .	172	328	6,903	12,251
Whiting, . . . . .	24,824	16,889	275,497	254,611
Witches, . . . . .	980	1,633	14,119	46,860
Herrings, . . . . .	71,443	40,971	990,729	677,804
Mackerel, . . . . .	511	336	184,207	141,384
Mullet (Grey), . . . . .	194	154	1,221	1,396
Pilchards, . . . . .	—	7	8,103	16,668
Sprats, . . . . .	8,355	8,833	25,009	22,123
Whitebait, . . . . .	493	460	6,685	8,679
Fish not separately distinguished, . . . . .	7,531	6,373	131,592	187,345
Total Wet Fish, . . . . .	547,545	510,270	7,391,067	7,846,687
Shell Fish:—				
Crabs, . . . . .	295	732	43,310	53,785
Crawfish (Crayfish), . . . . .	—	—	2,163	2,300
Lobsters, . . . . .	71	160	18,337	28,768
Oysters, . . . . .	17,255	10,165	97,179	78,483
Other Shell Fish, . . . . .	7,784	8,125	123,525	125,593
Total Shell Fish, . . . . .	25,405	19,182	289,514	288,929

STATEMENT of the TOTAL QUANTITY of the FISH landed on the SCOTTISH COASTS during the Month and Twelve Months ended 31st December, 1915, compared with the corresponding periods of the year 1914.

KINDS OF FISH.	December.		Twelve Months ended 31st December.	
	1915.	1914.	1915.	1914.
	Quantity			
	Cwt.	Cwt.	Cwt.	Cwt.
Herrings . . . . .	98,831	86,044	699,398	4,383,235
Sprats . . . . .	318	11,092	2,710	27,314
Sparlings . . . . .	98	40	510	550
Mackerel . . . . .	202	1,104	72,729	80,125
Cod and Codling . . . . .	19,378	38,120	397,327	687,801
Ling . . . . .	1,027	3,484	77,596	204,237
Torsk (Tusk) . . . . .	94	676	8,939	18,828
Saith (Coal Fish) . . . . .	6,604	7,211	119,739	264,602
Haddocks . . . . .	36,454	41,505	552,088	555,814
Whitings . . . . .	4,468	8,374	112,611	222,059
Conger Eels . . . . .	250	290	11,802	26,611
Gurnards . . . . .	479	507	7,985	7,219
Catfish . . . . .	344	640	21,672	26,225
Monks (Anglers) . . . . .	650	1,661	11,215	23,572
Hake . . . . .	157	848	7,777	27,415
Squids . . . . .	84	79	197	161
Turbot . . . . .	206	279	2,802	3,989
Halibut . . . . .	242	1,075	15,769	44,567
Lemon Soles . . . . .	1,359	1,982	25,037	30,568
Flounders . . . . .	333	253	5,735	7,334
Plaice . . . . .	1,438	2,562	34,832	50,937
Brill . . . . .	3	27	99	437
Dabs . . . . .	749	682	12,261	10,987
Witches . . . . .	108	1,112	2,166	20,051
Megrims . . . . .	81	626	7,547	16,358
Skates and Rays . . . . .	2,564	4,914	83,036	148,147
Unclassified kinds . . . . .	299	184	4,239	8,556
Totals . . . . .	176,820	215,371	2,297,818	6,897,699
Shell Fish :—	No.	* No.	No.	No.
Crabs . . . . .	15,316	29,908	1,382,972	1,565,711
Lobsters . . . . .	34,711	42,962	516,431	646,724
Oysters . . . . .	53,525	67,300	491,349	704,825
Clams . . . . .	Cwt. 982	Cwt. 110	Cwt. 9,241	Cwt. 31,883
Mussels . . . . .	13,784	11,936	168,129	129,417
Unclassified . . . . .	1,324	1,919	42,701	36,557

NOTE.—Landed by Foreign Vessels during the Twelve Months ended 31st December, 1915 (not included above), 380 cwts.  
The above figures are subject to correction in the Board's Annual Report.

STATEMENT of the TOTAL VALUE of the FISH landed on the SCOTTISH COASTS during the Month and Twelve Months ended 31st December, 1915, compared with the corresponding periods of the year 1914.

KINDS OF FISH.	December.		Twelve Months ended 31st December.	
	1915.	1914.	1915.	1914.
	Value			
	£	£	£	£
Herrings . . . . .	61,643	41,602	439,366	1,339,036
Sprats . . . . .	129	4,052	1,013	8,446
Sparlings . . . . .	225	100	1,199	1,377
Mackerel . . . . .	200	581	21,262	15,652
Cod and Codling . . . . .	30,247	38,938	416,712	434,047
Ling . . . . .	1,166	2,153	57,320	76,592
Torsk (Tusk) . . . . .	157	653	8,019	7,972
Saith (Coal Fish) . . . . .	2,619	3,188	49,587	55,492
Haddocks . . . . .	61,646	41,728	600,200	453,540
Whittings . . . . .	7,104	9,659	94,306	134,817
Conger Eels . . . . .	209	152	7,679	11,674
Gurnards . . . . .	222	171	2,683	1,166
Catfish . . . . .	326	358	12,941	8,135
Monks (Anglers) . . . . .	570	705	6,446	6,620
Hake . . . . .	369	1,305	11,568	21,765
Squids . . . . .	125	17	178	32
Turbot . . . . .	1,072	1,113	11,493	12,142
Halibut . . . . .	1,083	3,609	54,114	107,329
Lemon Soles . . . . .	6,643	7,128	99,290	81,348
Flounders . . . . .	406	209	4,909	5,868
Plaice . . . . .	3,319	6,235	68,747	88,228
Brill . . . . .	10	67	259	812
Dabs . . . . .	816	455	10,387	5,149
Witches . . . . .	270	2,398	4,949	24,668
Megrim . . . . .	256	1,572	19,784	23,173
Skates and Rays . . . . .	1,481	551	41,821	44,685
Unclassified kinds . . . . .	143	77	1,757	1,451
Totals . . . . .	182,460	170,276	2,047,989	2,971,216
Shell Fish :—	No.	No.	No.	No.
Crabs . . . . .	141	185	10,491	12,307
Lobsters . . . . .	1,906	979	24,441	30,074
Oysters . . . . .	180	283	1,897	718
Clams . . . . .	150	16	1,176	254
Mussels . . . . .	716	624	8,784	961
Unclassified . . . . .	326	424	11,263	612
Total Value . . . . .	3,419	3,511	58,052	65,026
Total Value of all Fish . . . . .	185,879	173,787	2,106,041	3,036,242

NOTE.—Landed by Foreign Vessels during the Twelve Months ended 31st December, 1915 (not included above), £443.  
The above figures are subject to correction in the Board's Annual Report



STATEMENT of the TOTAL QUANTITY and VALUE of the FISH returned as landed on the IRISH COASTS during the Month and Twelve Months ended 31st December, 1915, compared with the corresponding periods of the Year 1914.

Kinds of Fish.	December		Twelve Months ended 31st December.	
	1915.	1914.	1915.	1914.
QUANTITY.				
Brill, . . . . .	Cwt. 21	Cwt. 20	Cwt. 263	Cwt. 428
Soles, . . . . .	45	44	1,396	1,718
Turbot, . . . . .	24	16	378	553
Total Prime Fish, . . . . .	90	80	2,037	2,699
Cod, . . . . .	664	877	11,467	18,887
Conger Eel, . . . . .	193	229	3,056	4,879
Haddock, . . . . .	82	250	1,474	3,436
Hake, . . . . .	175	71	2,877	3,988
Herrings, . . . . .	26,340	18,781	301,528	282,269
Ling, . . . . .	26	54	1,351	3,165
Mackerel, . . . . .	6,066	3,509	109,157	187,091
Plaice, . . . . .	363	246	8,134	11,012
Ray or Skate, . . . . .	375	524	6,969	7,523
Sprats, . . . . .	17	309	264	411
Whiting, . . . . .	1,597	418	8,181	11,333
All other except Shell Fish, . . . . .	652	540	12,277	15,228
Total, . . . . .	36,640	25,888	468,772	551,921
Shell Fish:—	No.	No.	No.	No.
Crabs, . . . . .	—	—	89,245	137,653
Lobsters, . . . . .	2,111	1,594	234,339	412,413
Mussels, . . . . .	Cwt. 2,179	Cwt. 869	Cwt. 7,135	Cwt. 9,849
Oysters, . . . . .	No. 302,130	No. 326,910	No. 482,354	No. 567,239
Other Shell Fish, . . . . .	Cwt. 1,018	Cwt. 1,049	Cwt. 11,251	Cwt. 12,286
VALUE.				
Brill, . . . . .	£ 61	£ 60	£ 646	£ 1,030
Soles, . . . . .	255	222	6,679	7,453
Turbot, . . . . .	112	64	1,743	2,488
Total Prime Fish, . . . . .	428	346	9,068	10,971
Cod, . . . . .	1,240	986	13,571	16,673
Conger Eel, . . . . .	209	169	2,458	3,260
Haddock, . . . . .	100	226	1,525	3,074
Hake, . . . . .	466	141	5,357	5,200
Herrings, . . . . .	12,963	8,828	170,071	94,497
Ling, . . . . .	26	33	1,056	2,282
Mackerel, . . . . .	4,990	1,585	55,128	57,931
Plaice, . . . . .	1,011	435	12,505	12,966
Ray or Skate, . . . . .	216	265	3,261	3,354
Sprats, . . . . .	6	73	83	94
Whiting, . . . . .	2,266	352	9,724	6,962
All other except Shell Fish, . . . . .	700	469	9,009	8,252
Total, . . . . .	24,601	13,908	292,816	225,546
Shell Fish:—	—	—	655	805
Crabs, . . . . .	—	—	—	—
Lobsters, . . . . .	90	59	3,763	13,720
Mussels, . . . . .	291	93	906	1,278
Oysters, . . . . .	536	650	884	1,062
Other Shell Fish, . . . . .	302	268	2,771	2,670
Total, . . . . .	1,219	1,070	13,979	19,535
Total Value of Fish landed, . . . . .	25,820	14,978	306,795	245,081

## EMIGRATION FROM IRELAND.

TABLE showing, by Destinations, the Numbers of Emigrants (Natives of Ireland) who left the Ports of Ireland during the Months of October, November and December, 1915, and the total for the Twelve Months ended the 31st December, 1915, together with the total Number of Emigrants in each of the corresponding periods of the year, 1914.

DESTINATION.	October, 1915.	November, 1915.	December, 1915.	Twelve Months ended 31st Dec., 1915.
<b>FOREIGN COUNTRIES AND THE COLONIES :—</b>				
America (U.S.), . . . . .	1,165	1,241	37	7,096
Canada, . . . . .	43	28	7	597
South Africa, . . . . .	18	4	—	68
Australia, . . . . .	47	22	1	347
New Zealand, . . . . .	3	3	—	53
Other Countries, . . . . .	—	—	—	15
<b>Total, . . . . .</b>	<b>1,276</b>	<b>1,298</b>	<b>45</b>	<b>8,176</b>
<b>GREAT BRITAIN :—</b>				
England and Wales, . . . . .	201	175	145	1,954
Scotland, . . . . .	227	85	50	944
<b>Total, . . . . .</b>	<b>428</b>	<b>260</b>	<b>195</b>	<b>2,898</b>
<b>General Total, 1915,</b>	<b>1,704</b>	<b>1,558</b>	<b>240</b>	<b>11,074</b>
<b>General Total, 1914,</b>	<b>2,331</b>	<b>670</b>	<b>256</b>	<b>20,314</b>

The figures in the above Table have been abstracted from the monthly Return published by the Registrar-General for Ireland.

*The figures are subject to revision in the Annual Report.*

MONTHLY AND QUARTERLY AVERAGE PRICES FOR IRELAND OF CROPS, LIVE STOCK, MEAT, PROVISIONS, &c., for the period ended 31st December, 1915.

PRODUCT.	MONTH.			QUARTER.	
	October.	November	December.	1915.	1914.
<b>CROPS :</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Wheat, .. per 112 lbs.	10 10	12 2	11 8	11 6	9 6½
Oats (White), ..	8 9	9 10	9 11	9 6	8 1½
(Black), ..	8 8	9 6	9 3	9 1	7 0½
Barley, ..	10 1	12 1	—	10 8	7 3½
Potatoes, ..	3 6½	3 8½	3 9½	3 7½	3 2½
Hay (Clover), ..	4 1½	4 6½	4 11	4 5½	3 11½
(Meadow) ..	3 0½	3 8½	3 8½	3 5	3 1½
Grass Seed—					
(Perennial Rye), ..	12 5	12 8	13 5	12 8	9 3½
(Italian Rye), ..	20 1	23 2	—	21 0	11 4
Flax, .. per 14 lbs.	18 2	20 4	20 10	19 10	11 8
<b>LIVE STOCK :</b>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>
Calves (young), per head	3 9 0	3 4 9	3 1 3	3 6 0	2 12 3
Store Cattle—					
Over 6 and not exceeding 12 months, per head	6 15 9	6 13 6	6 13 3	6 14 3	5 11 0
One year old and under two years, per head	11 5 6	11 3 3	11 1 0	11 3 9	9 1 9
Two years old and under three years, per head	15 10 0	15 8 3	15 3 0	15 8 3	12 6 3
Three years old and over, per head	18 2 6	18 4 0	18 1 3	18 2 9	14 5 0
Fat Cattle—					
Two years old and under three years, per head	19 16 3	18 19 6	18 2 3	19 4 3	15 13 3
Three years old and over, per head	22 6 6	21 1 9	20 15 3	21 11 6	17 5 3
Cows and Bulls, ..	18 7 3	16 17 9	16 9 0	17 8 0	13 17 0
Springers—					
Cows and Heifers, ..	19 17 0	20 1 9	19 1 9	19 15 3	16 1 9
Milch Cows (down calved), per head	17 18 0	17 19 3	17 19 6	17 18 9	14 15 0
Lambs (under 12 months old), .. per head	1 19 3	1 19 6	2 0 6	1 19 6	1 14 0
Store Sheep—					
One year old and under two years, per head	2 5 0	2 10 0	2 9 6	2 6 6	2 1 3
Two years old and over, per head	2 12 3	1 17 3	1 18 9	2 11 0	2 3 0
Fat Sheep—					
One year old and under two years, per head	3 0 3	2 18 3	2 18 9	2 19 3	2 12 0
Two years old and over, per head	3 2 6	2 16 0	2 16 3	2 19 3	2 10 6
Young Pigs—					
8 to 10 weeks old, per head	1 16 9	1 18 0	1 12 9	1 16 9	1 7 0
Store Pigs—					
10 weeks to 4 months old, per head	2 2 9	2 3 3	2 5 3	2 3 6	1 11 9
4 months old and over, ..	2 14 6	2 14 0	2 11 6	2 14 0	1 19 6
Fat Pigs, ..	6 12 6	7 10 6	5 7 3	7 6 9	4 17 0
Sows, ..	9 8 0	10 11 6	7 16 9	9 15 6	6 16 0
<b>MEAT, PROVISIONS, &amp;c.</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Beef (Live), per 112 lbs.	45 0	43 3	44 0	44 0	37 6
(Dead), ..	78 9	75 9	77 0	77 0	65 9
Mutton (Live) ..	43 9	43 6	44 0	43 9	39 0
(Dead) ..	76 6	76 3	77 0	76 6	68 3
Pork (Dead) ..	78 3	78 9	77 6	78 3	58 0
Butter (Creamery), ..	164 6	150 0	162 9	159 6	127 6
(Factory) ..	136 9	122 9	129 9	131 0	111 0
(Farmers) ..	132 6	122 9	122 9	127 9	112 0
Eggs, .. per 120	16 9	20 7	22 2	19 0	16 4½

QUARTERLY AVERAGE PRICES FOR EACH PROVINCE, OF CROPS, LIVE STOCK,  
MEAT, PROVISIONS, &c., for the Quarter ended 31st December, 1915.

PRODUCT.	PROVINCE.			
	Leinster.	Munster.	Ulster.	Connaught.
<b>CROPS:</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Wheat, .. per 112 lbs.	11 9	10 5	—	—
Oats (White), .. "	10 0	9 8	9 6	8 9
" (Black), .. "	9 7	9 1	—	—
Barley, .. "	11 10	10 7	—	—
Potatoes, .. "	3 8½	4 2½	3 2	3 3½
Hay (Clover), .. "	5 10½	4 0½	4 10½	3 11½
" (Meadow), .. "	3 8½	3 4	3 11½	3 0½
Grass Seed—				
(Perennial Rye), .. "	—	—	12 8	—
(Italian Rye), .. "	—	—	21 0	—
Flax, .. per 14 lbs.	—	—	19 10	—
<b>LIVE STOCK:</b>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>
Calves (young) .. per head	3 7 0	3 1 0	2 8 9	3 15 0
Store Cattle—				
Over 6 and not exceeding 12 months, .. per head	6 19 3	6 9 0	6 15 3	6 17 6
One year old and under two years, .. per head	11 18 3	11 3 0	10 6 3	11 4 6
Two years old and under three years, per head	16 11 3	15 5 0	13 11 0	15 4 0
Three years old and over, per head	19 5 6	17 1 3	17 14 9	18 5 0
Fat Cattle—				
Two years old and under three years, per head	19 13 6	19 8 9	18 10 9	19 11 9
Three years old and over, per head	22 1 9	21 3 9	22 2 9	20 12 3
Cows and Bulls, .. "	18 19 0	16 7 3	18 5 0	21 18 3
Springers—				
Cows and Heifers, per head	20 10 0	18 15 3	20 8 0	19 9 0
Milch Cows (down calved), .. "	18 7 6	18 9 0	18 15 3	16 5 9
Lambs (under 12 months old) per head	2 0 6	2 0 9	1 13 6	1 18 3
Store Sheep—				
One year old and under two years, .. per head	2 7 0	2 3 9	1 19 3	2 8 3
Two years old and over, per head	2 5 6	1 14 9	1 15 3	2 15 9
Fat Sheep—				
One year old and under two years, per head	2 12 6	3 1 0	2 13 0	3 4 3
Two years old and over, .. "	2 14 6	2 17 3	2 12 3	3 10 6
Young Pigs—				
8 to 10 weeks old per head	1 12 3	1 13 6	2 0 3	1 18 9
Store Pigs—				
10 weeks to 4 months old, per head	2 8 0	1 16 0	—	—
4 months old and over, .. "	2 19 6	2 12 9	—	—
Fat Pigs, .. "	5 6 6	5 10 9	—	7 12 9
Sows, .. "	9 10 0	10 5 9	7 14 6	10 19 3
<b>MEAT, PROVISIONS, &amp;c.</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Beef (Live), .. per 112 lbs.	44 0	—	—	—
" (Dead), .. "	77 0	—	—	—
Mutton (Live), .. "	43 9	—	—	—
" (Dead), .. "	76 6	—	—	—
Pork (Dead), .. "	75 9	78 9	73 6	74 9
Butter (Creamery), .. "	160 0	159 6	—	—
" (Factory), .. "	—	131 0	—	—
" (Farmers), .. "	128 6	129 3	122 0	122 9
Eggs, .. per 120	19 8	18 7	—	17 9
Wool, .. per lb.	1 5½	—	—	1 5½

NUMBER OF ANIMALS included in Returns furnished under the MARKETS and FAIRS (Weighing of Cattle) Act, 1891, Sections 3 and 4,  
during the Quarter ended 31st December, 1916.

WEEK ENDED	FAT CATTLE.					FAT SHEEP.				
	Dublin.		Belfast.		Total Number of Cattle included in Returns.	Dublin.		Belfast.	Total Number of Sheep included in Returns.	
	Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.	Corporation Market Authorities.	Mr. John Robson, Auctioneer.		Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.			
1915.										
October 7 . . .	51	227	32	63	373	—	199	—	199	
" 14 . . .	47	189	26	40	302	—	287	—	287	
" 21 . . .	50	254	27	39	370	—	169	—	169	
" 28 . . .	56	144	26	58	284	—	343	—	343	
November 4 . . .	66	217	27	53	363	—	292	—	292	
" 11 . . .	67	133	27	47	274	—	258	—	258	
" 18 . . .	58	153	26	43	280	—	358	—	358	
" 25 . . .	64	172	28	45	309	—	121	—	121	
December 2 . . .	83	174	27	50	334	—	124	—	124	
" 9 . . .	62	135	27	42	266	—	235	—	235	
" 16 . . .	65	179	27	28	299	—	330	—	330	
" 23 . . .	43	67	27	—	137	—	8	—	8	
" 30 . . .	61	84	27	44	216	—	255	—	255	
Totals, . . .	773	2,128	354	552	3,807	—	2,979	—	2,979	

WEEKLY AVERAGE PRICES of WHEAT, OATS, and BARLEY, per 112 lbs  
computed from Market Returns of certain quantities of these Cereals  
supplied by Officers of Customs and Excise, during the QUARTER  
ended 31st December, 1915.

Returns received in the Week ended	WHEAT.		OATS.		BARLEY.	
	Average Price per 112 lbs.	Quantity.	Average Price per 112 lbs.	Quantity.	Average Price per 112 lbs.	Quantity
		Cwts. of 112 lbs.		Cwts. of 112 lbs.		Cwts. of 112 lbs.
1915.	s. d.		s. d.		s. d.	
October 2	10 2	536	7 7	19,918	9 3	3,084
" 9	10 4	703	7 10	8,134	9 5	3,284
" 16	10 8	452	8 7	10,785	10 0	2,580
" 23	11 1	1,030	9 0	7,788	10 8	2,600
" 30	11 4	1,054	9 10	25,225	11 9	2,139
November 6	12 0	821	9 10	13,529	12 0	1,842
" 13	12 5	1,112	9 7	15,159	12 2	1,456
" 20	12 4	897	9 7	13,143	12 0	870
" 27	11 4	536	9 9	13,855	12 3	716
December 4	12 0	364	9 7	0,619	10 4	52
" 11	11 6	405	9 8	14,875	12 0	40
" 18	11 7	562	9 8	11,921	11 6	120
" 25	11 10	322	9 7	8,951	—	—
" 31	11 6	189	9 11	6,664	—	—

QUARTERLY AVERAGE PRICES of FAT CATTLE and FAT SHEEP, per 112 lbs., LIVE  
WEIGHT, sold in DUBLIN MARKETS during the period ended 31st  
December, 1915, and also for the corresponding period during eighteen  
preceding years.

Year.	Fat Cattle.	Fat Sheep.	Year.
	£ s. d.	£ s. d.	
1915,	2 4 0	2 3 9	1915
1914,	1 17 6	1 19 0	1914.
1913,	1 13 8	1 18 5	1913.
1912,	1 10 4	1 10 10	1912.
1911,	1 12 7	1 10 6	1911.
1910,	1 12 1	1 12 1	1910.
1909,	1 11 9	1 8 5	1909.
1908,	1 11 4	1 11 6	1908.
1907,	1 9 6	1 15 7	1907.
1906,	1 9 0	1 17 10	1906.
1905,	1 8 3	1 14 6	1905.
1904,	1 9 2	1 15 0	1904.
1903,	1 9 5	1 13 10	1903.
1902,	1 11 5	1 12 3	1902.
1901,	1 9 11	1 10 3	1901.
1900,	1 10 7	1 12 4	1900.
1899,	1 10 8	1 12 4	1899.
1898,	1 7 9	1 11 5	1898.
1897,	1 8 2	1 12 7	1897.

# BUTTER PRICES DURING THE QUARTER

ABSTRACTED FROM "THE GROCER," "GROCER'S REVIEW."

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the an Irish Creamery would be 5s. to 7s. per cwt. less than freight, commission,

COUNTRY OF ORIGIN.	Type of Package.	Place of Sale.	WEEK ENDED			
			OCTOBER.			
			2nd.	9th.	16th.	23rd.
IRELAND— Creamery Butter.	Kieis, kegs, or pyramid boxes	London, . .	Per cwt. s. s. 176-182	Per cwt. s. s. 172-182	Per cwt. s. s. 168-176	Per cwt. s. s. 156-167
		Liverpool, . .	176-180	176-184	170-177	154-163
		Bristol, . .	178-182	180-184	178-184	168-176
		Cardiff, . .	170-184	175-185	176-182	172-175
		Manchester, . .	174-186	176-186	172-185	158-170
		Birmingham, . .	181-182	180-184	—	—
		Glasgow, . .	180-182	184-186	176-178	166-168
		Limerick, . .	—	—	—	—
		Cork, . .	—	—	—	—
		Belfast, . .	—	—	—	—
	1lb. rolls, in boxes, Salted or Unsalted.	Dublin, . .	178-179½	177¼-179½	177¼-179½	161-168
		F.O.R., . .	172½-186½	172½	168-172½	161-172½
	Factories,	London, . .	140-165	140-167	140-160	135-150
		Liverpool, . .	140-146	140-145	138-150	130-134
		Bristol, . .	140-158	138-150	138-148	130-145
Cardiff, . .		142-152	143-154	143	142-146	
Manchester, . .		—	—	—	—	
Farmers' Butter,	Cork, . .	141-146	141-143	141	126-141	
	Firkins 1st, Export Price	—	—	—	—	
	Do. 2nd „	135-138	132-136	130-132	121-131	
	Do. 3rd „	130	130	120-122	112-115	
	Fresh, . .	142-144	148-154	140-155	124-138	
FRANCE,	12x21b. rolls,	London, . .	Per doz. lbs. 15/6-18/-	Per doz. lbs. 15/6-18/-	Per doz. lbs. 15/6-18/-	Per doz. lbs. 15/-17/6
	Paris baskets,	do., . .	Per cwt. 151-160	Per cwt. 151-160	Per cwt. 151-160	Per cwt. 147-156
DENMARK AND SWEDEN.	Kieis, . .	Copenhagen Quotation.	164 Kr. 184/9 per 50 cwt. Kilos	170 Kr. 191/11 per 50 cwt. Kilos	Kr. — per 50 cwt. Kilos	Kr. — per 50 cwt. Kilos
		Average over- price.	—	—	—	—
		London, . .	198-202	205-209	—	160-182
		Liverpool, . .	190-198	195-203	190-200	160-180
		Bristol, . .	—	—	—	—
		Cardiff, . .	190	209	210	—
		Manchester, . .	190-196	192-206	—	175-186
		Birmingham, . .	192-194	200-202	—	—
		Newcastle-on- Tyne, . .	189-200	196-202	196-202	160-180
		Glasgow, . .	190	198-200	200-202	180
	1lb. rolls, 10x24 lb. boxes.	Leith, . .	192	202	—	—
		Hull, . .	195-198	190-196	190-198	173-180
		F.O.R. Lon- don	—	—	—	—
FINLAND	Kieis, . .	Manchester, . .	176-184	176-192	174-186	165-176
		Liverpool, . .	—	—	—	—
		Hull, . .	186-190	176-186	170-189	152-164
		Cardiff, . .	—	185	—	—

ENDED 31ST DECEMBER, 1915.

"GROCER'S GAZETTE," AND OTHER TRADE REPORTS.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

WEEK ENDED

NOVEMBER.					DECEMBER.			
30th.	6th.	13th.	20th.	27th.	4th.	11th.	18th.	25th.
Per cwt. s. s. 148-158 150-155 156-164 156-162 150-160 158-160 154-155 — — — 149/4-154 151/8-172/8	Per cwt. s. s. 146-156 150-155 158-164 150-164 145-158 156-158 158-160 — — — 149/4 151/8-172/8	Per cwt. s. s. 150-158 150-158 158-164 154-160 150-162 157-160 160-162 — — — 149/4-154 156/4-172/8	Per cwt. s. s. 152-162 154-160 160-166 158-164 150-166 160-162 166-168 — — — 154-158/8 161-172/8	Per cwt. s. s. 158-168 158-168 162-166 165-168 156-170 162-166 168-174 — — — 158-163/4 161-172/8	Per cwt. s. s. 160-168 164-168 168-172 165-168 166-172 168-170 174-176 — — — 165-168 172/8	Per cwt. s. s. 160-168 160-170 168-172 166-176 160-172 168-170 174-176 — — — 165/8-168 170/4-172/8	Per cwt. s. s. 152-160 160-168 158-170 160-168 162-170 — 172-174 — — — 163/4-168 170/4-172/8	Per cwt. s. s. 158-160 156-164 165-170 154-164 — — — — — — — 163/4-168 168-172/8
124-136 128-130 130-138 130-142 — 121-126 116-117 112 118-123	124-140 126-132 130-138 138-142 — 128-125 115-117 113 120-125	126-149 126-130 130-138 138 — 121-124 113-118 105-111 124-132	130-149 126-132 130-138 138-142 — 121-129 114-124 110-112 136-138	130-150 128-132 130-138 130-135 — 129-136 122-126 115 138-140	136-148 132-134 130-138 140-146 — 132-136 122-126 115 136-139	133-148 126-130 130-138 144-150 — 138-140 122 118-115 138-139	— 125-130 130-136 140-148 — 142-145 118-122 109 138	— 122-125 130-136 145-150 — 146-147 113-118 107 135-143
Per doz. lbs. 15-17/6 Per cwt. 147-156	Per doz. lbs. 14/6-17 Per cwt. 143-152	Per doz. lbs. 14/6-17 Per cwt. 143-152	Per doz. lbs. 14/6-17/6 Per cwt. 149-153	Per doz. lbs. 14/6-18 Per cwt. 153-162	Per doz. lbs. 14/6-18 Per cwt. 153-162	Per doz. lbs. 14/6-18 Per cwt. 153-162	Per doz. lbs. 14/6-18 Per cwt. 153-162	Per doz. lbs. 14/6-18 Per cwt. 153-162
Kr. per 50 Kilos } = per cwt. —	Kr. per 50 Kilos } = per cwt. —	Kr. per 50 Kilos } = per cwt. —	Kr. per 50 Kilos } = per cwt. —	Kr. per 50 Kilos } = per cwt. —	Kr. per 50 Kilos } = per cwt. —	Kr. per 50 Kilos } = per cwt. —	Kr. per 50 Kilos } = per cwt. —	Kr. per 50 Kilos } = per cwt. —
158-164 158-168 — 180 162-172 166-170 162-170	160-164 160-168 — 174 165-171 168-170 162-168	170-174 164-176 — 176-178 169-176 170-172 165-177	174-180 168-183 — 180 173-180 176-178 174-180	178-182 169-186 — 187 178-186 180-182 178-184	180-182 180-186 — 187 182-188 182-184 177-183	176-180 176-184 — 184 180-187 180-184 175-180	170-174 172-180 — 185-186 176-182 178-182 168-177	160-168 158-169 — 183 160-170 166-170 160-164
160-164 156-180 160-180 —	168-170 165 165-180 —	170-172 168 168-178 —	174-176 175 175-180 —	181-182 180 179-185 —	184-185 185 180-184 —	184-185 183-185 180-182 —	180-182 176-178 170-178 —	174-176 168 170-172 —
152-164 150-158 160-165	153-162 158-160 163	158-166 160-164 160-164	153-168 — 162	160-174 — 164-174	162-172 — 172-174	160-172 — 164-172	160-167 — 156-160 166	154 160 — — 158

[Continued on pages 380 and 381.]



**BUTTER PRICES DURING THE QUARTER**  
**ABSTRACTED FROM "THE GROCER," "GROCER'S REVIEW,"**

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the  
 an Irish Creamery would be 5s. to 7s. per cwt. less than  
 freight, commission,

COUNTRY OF ORIGIN.	Type of Package.	Place of Sale.	WEEK ENDED.			
			OCTOBER			
			2nd.	9th.	16th.	23rd.
RUSSIA AND SIBERIA,	Kieis,	London, .	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.
		Liverpool, .	136-142	136-142	136-142	134-140
		Bristol, .	130-142	130-146	133-146	130-140
		Cardiff, .	132-146	132-148	132-149	132-149
		Manchester, .	136-150	134-152	134-153	140-150
		Birmingham, .	134-146	136-146	134-146	130-146
		Glasgow, .	140-144	140-144	—	—
		Leith, .	144	—	144-146	144
		Hull, .	140	140	—	—
			—	140-146	145	134-140
HOLLAND,	Boxes, .	London, .	190-194	200-204	208-212	—
	Rolls, .	do., .	Per doz. lbs. —	Per doz. lbs. —	Per doz. lbs. 20/6-21	Per doz. lbs. —
	Boxes, .	Glasgow, —	Per cwt. —	Per cwt. —	Per cwt. —	Per cwt. —
		Fresh, .	—	—	—	—
		Salt, .	—	—	—	—
		Manchester, .	—	—	—	—
ITALY,	Rolls, .	London, .	Per doz. lbs. —	Per doz. lbs. —	Per doz. lbs. —	Per doz. lbs. —
			—	—	—	—
CANADA,	56 lb. Boxes, .	London, .	Per cwt. —	Per cwt. —	Per cwt. —	Per cwt. —
		Liverpool, .	—	—	—	—
		Bristol, .	170-180	—	—	—
		Cardiff, .	178-180	180-184	178-180	168-170
		Birmingham, .	—	—	—	—
		Manchester, .	—	—	—	—
AUSTRALIA AND NEW ZEALAND,*	Boxes, .	London, .	A.s. —	A.s. —	A.s. —	A.s. —
		Liverpool, .	U. —	U. —	U. —	U. —
		Bristol, .	Z. —	Z. —	Z. —	Z. —
		Cardiff, .	A. —	A. —	A. —	A. —
		Manchester, .	Z. —	Z. —	Z. —	Z. —
		Birmingham, .	A. —	A. —	A. —	A. —
		Glasgow, .	Z. —	Z. —	Z. —	Z. —
		Leith, .	A. —	A. —	A. —	A. —
		Hull, .	Z. —	Z. —	Z. —	Z. —
			A. —	A. —	A. —	A. —
			Z. —	Z. —	Z. —	Z. —
			—	—	—	—
			—	—	—	—
			—	—	—	—
ARGENTINA,	Boxes, .	London, .	—	—	—	—
		Liverpool, .	—	—	—	—
		Bristol, .	—	—	—	—
		Cardiff, .	—	—	—	—
		Manchester, .	—	—	—	—
		Birmingham, .	—	—	—	—
UNITED STATES,	Tubs and boxes, .	London, .	—	—	—	—
		Liverpool, .	—	—	—	150-158
		Bristol, .	145-151	148-162	150-162	150-162
		Cardiff, .	—	—	—	—
		Manchester, .	—	—	—	—
			—	—	—	—

ENDED 31ST DECEMBER, 1915—*Continued.*

"GROCER'S GAZETTE," AND OTHER TRADE REPORTS.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

[illegible]

## TABLES SHOWING THE EXPORTS

## TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT  
the PORTS of EMBARKATION

PORTS IN IRELAND.	CATTLE.							SHEEP.			
	Fat.	Stores (fatten- ing).	Milch Cows.	Spring- ers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ballina. .	197	—	—	—	234	—	431	225	—	394	619
Belfast. .	13,386	24,122	2,812	—	324	857	41,501	2,292	199	—	2,491
Cork. .	9,353	5,599	1,452	2	119	4,469	20,994	2,277	163	—	2,440
Drogheda. .	14,579	350	1,256	—	—	—	15,185	4,548	—	—	4,548
Dublin. .	71,548	15,634	5,346	12	384	1,425	94,349	43,367	—	—	43,367
Dundalk. .	7,411	7,161	228	—	—	—	14,800	14,123	53	—	14,176
Greenore. .	23	320	236	—	—	—	579	359	—	—	359
Larne. .	218	2,897	27	—	—	569	3,711	65	101	—	166
Limerick. .	329	71	—	—	256	—	656	—	—	—	—
Londonderry. .	2,691	13,250	197	—	1,173	655	17,966	3,099	1,514	—	4,613
Millford. .	—	—	—	—	—	—	—	—	—	20	20
Mulroy. .	9	—	—	—	—	—	9	—	—	—	—
Newry. .	449	3,234	37	—	—	—	3,720	2,306	360	—	2,666
Portrush. .	—	—	—	—	—	—	—	—	—	—	—
Sligo. .	887	230	—	—	—	—	917	705	—	1,671	2,376
Waterford. .	13,919	10,024	21	—	257	534	24,755	5,882	—	—	5,882
Westport. .	98	—	—	—	306	—	404	20	—	—	20
<b>TOTAL.</b>	<b>134,897</b>	<b>82,892</b>	<b>10,612</b>	<b>14</b>	<b>3,053</b>	<b>8,509</b>	<b>239,977</b>	<b>79,268</b>	<b>2,390</b>	<b>2,085</b>	<b>83,743</b>

## TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT  
the PORTS of DEBARKATION

PORTS IN GREAT BRITAIN.	CATTLE.							SHEEP.			
	Fat.	Stores (fatten- ing).	Milch Cows.	Spring- ers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ardrassan. .	—	—	—	—	—	—	—	—	—	—	—
Ayr. .	2,928	12,657	356	—	—	76	16,017	65	105	—	170
Bristol. .	169	1,534	58	—	—	279	2,040	834	—	—	834
Fishguard. .	1,914	8,647	1,156	1	—	3,216	14,934	1,873	163	—	2,041
Fleetwood. .	627	1,293	702	—	1	69	2,692	1,945	195	—	2,140
Glasgow. .	21,175	19,893	2,190	—	2,727	1,797	47,782	355	—	40	395
Greenock. .	3,038	5,200	37	—	14	381	8,670	248	—	—	248
Heysham. .	6,933	8,717	1,977	—	1	182	17,810	3,483	1,462	—	4,945
Holyhead. .	24,153	6,598	2,490	12	21	472	33,746	11,054	—	—	11,054
Liverpool. .	66,930	15,683	1,573 <sup>v</sup>	1	289	1,468	85,944	54,004	465	2,045	56,514
London. .	—	—	—	—	—	—	—	—	—	—	—
Manchester. .	4,417	—	38	—	—	—	4,455	4,362	—	—	4,362
Plymouth. .	—	—	—	—	—	—	—	—	—	—	—
Preston. .	1,128	—	34	—	—	—	1,162	947	—	—	947
Shiloh. .	1,455	32	1	—	—	—	1,488	93	—	—	93
Southamp on. .	—	—	—	—	—	—	—	—	—	—	—
Stranraer. .	30	2,638	—	—	—	569	2,237	—	—	—	—
<b>TOTAL.</b>	<b>134,897</b>	<b>82,892</b>	<b>10,612</b>	<b>14</b>	<b>3,053</b>	<b>8,509</b>	<b>239,977</b>	<b>79,268</b>	<b>2,390</b>	<b>2,085</b>	<b>83,743</b>

## AND IMPORTS OF ANIMALS.

## I.

BRITAIN during the Three Months ended 31st DECEMBER, 1915, showing  
IN IRELAND.

SWINE.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN IRELAND.
Fat.	Stores.	Total.		Stal- lions.	Mares.	Geld- ings.	Total.				
287	—	287	1	—	—	—	—	—	—	1,338	Ballina.
2,348	—	2,348	—	5	74	197	276	—	7	46,623	Belfast.
5,635	2	5,637	—	—	22	36	58	—	4	29,133	Cork.
999	86	1,085	4	—	—	3	3	—	—	20,825	Drogheda.
32,043	39	32,082	9	46	275	187	508	1	3	170,319	Dublin.
7,754	—	7,754	484	—	10	11	21	—	24	37,259	Dundalk.
83	—	83	—	—	8	20	28	—	29	1,078	Greenore.
—	1	1	1	—	14	28	42	—	—	3,921	Larne.
—	—	—	—	—	—	—	—	—	—	656	Limerick.
2,491	2	2,493	—	1	4	8	13	—	2	25,087	Londonderry.
165	—	165	—	—	—	—	—	—	—	185	Milford.
230	—	230	—	—	—	—	—	—	—	239	Mulroy.
385	—	385	2	—	—	—	—	—	3	6,776	Newry.
47	—	47	—	—	—	—	—	—	—	47	Portrush.
8,009	—	8,009	10	—	—	2	2	—	—	11,314	Sligo.
11,395	50	11,445	1	—	43	67	110	—	2	42,195	Waterford.
—	—	—	—	—	—	—	—	—	—	424	Westport.
71,871	180	72,051	512	52	450	559	1,061	1	74	397,419	TOTAL.

## II.

BRITAIN during the Three Months ended 31st DECEMBER, 1915, showing  
IN GREAT BRITAIN.

SWINE.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN GREAT BRITAIN.
Fat.	Stores.	Total.		Stal- lions.	Mares.	Geld- ings.	Total.				
—	—	—	—	1	16	59	76	—	1	77	Ardrossan.
2,020	—	2,020	—	2	1	2	5	—	—	18,212	Ayr.
318	—	318	—	—	1	1	2	—	1	3,195	Bristol.
11,528	—	11,528	1	—	57	83	140	—	2	28,646	Flauguard.
24	—	24	—	2	14	40	56	—	—	4,912	Fleetwood.
3,228	43	3,271	—	4	51	54	109	—	8	51,565	Glasgow.
67	—	67	—	—	—	4	4	—	—	8,989	Greenock.
4,149	—	4,149	—	—	19	42	61	—	1	26,966	Heysham.
23,850	—	23,850	1	43	222	166	431	—	31	69,113	Holyhead.
25,029	136	25,165	509	—	42	72	114	—	27	168,273	Liverpool.
—	—	—	—	—	—	1	1	—	3	4	London.
477	—	477	—	—	7	2	9	—	—	9,303	Manchester.
150	—	150	—	—	3	5	8	—	—	158	Plymouth.
730	—	730	—	—	—	—	—	—	—	2,339	Preston.
301	—	301	—	—	—	—	—	1	—	1,883	Silloth.
—	1	1	1	—	3	—	3	—	—	3	Southampton.
—	—	—	—	—	14	28	42	—	—	3,281	Stranraer.
71,871	180	72,051	512	52	450	559	1,061	1	74	397,419	TOTAL.



## III.

BRITAIN during the Three Months ended 31ST DECEMBER, 1915, showing  
DEBARKATION IN IRELAND.

PIGS.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN IRELAND.
Fat.	Stores.	Total.		Stal- Hons.	Mares.	Geld- ings.	Total.				
—	—	—	—	—	—	—	—	—	—	—	Ballina.
—	—	—	—	15	52	76	143	—	—	6,424	Belfast.
—	—	—	—	—	—	—	—	—	—	—	Coleraine.
—	—	—	—	186	248	62	496	—	—	501	Cork.
—	—	—	—	—	2	2	4	—	—	—	Drogheda.
—	2	2	—	135	380	146	661	—	—	1,332	Dublin.
—	—	—	—	—	3	—	3	—	—	217	Dundalk.
—	—	—	—	—	154	154	308	—	—	308	Greenore.
—	—	—	—	8	24	10	42	—	—	1,551	Larne.
—	—	—	—	—	—	1	1	—	—	—	L. merick.
—	—	—	—	1	31	7	39	—	—	672	Londonderry.
—	—	—	—	—	—	—	—	—	—	—	Milford.
—	—	—	—	—	—	—	—	—	—	20	Mulroy.
—	—	—	—	—	3	—	3	—	—	3	Newry.
—	2	2	—	—	5	—	5	—	—	73	Portrush.
—	—	—	—	—	—	—	—	—	—	—	Sligo.
—	—	—	—	—	—	—	—	—	—	34	Waterford.
—	—	—	—	58	155	155	368	—	—	463	Westport.
—	—	—	—	—	—	—	—	—	—	—	Wexford.
—	4	4	—	403	1,058	613	2,074	—	—	11,603	TOTAL.

## IV.

BRITAIN during the Three Months ended 31ST DECEMBER, 1915, showing  
IN GREAT BRITAIN.

PIGS.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN GREAT BRITAIN.
Fat.	Stores.	Total.		Stal- Hons.	Mares.	Geld- ings.	Total.				
—	—	—	—	—	3	5	8	—	—	2,071	Ardrossan.
—	—	—	—	6	8	4	18	—	—	4,401	Ayr.
—	—	—	—	—	—	—	—	—	—	—	Barrow.
—	—	—	—	26	32	28	86	—	—	86	Bristol.
—	—	—	—	—	—	—	—	—	—	—	Cardiff.
—	—	—	—	—	—	—	—	—	—	1	Falmouth.
—	—	—	—	204	355	182	741	—	—	751	Fishguard.
—	—	—	—	3	1	7	11	—	—	11	Fleetwood.
—	2	2	—	10	104	77	191	—	—	959	Glasgow.
—	—	—	—	—	—	1	1	—	—	485	Greenock.
—	—	—	—	3	2	11	16	—	—	18	Heysham.
—	2	2	—	130	510	275	915	—	—	920	Holyhead.
—	—	—	—	1	9	9	19	—	—	19	Liverpool.
—	—	—	—	—	—	—	—	—	—	—	London.
—	—	—	—	—	—	—	—	—	—	—	Manchester.
—	—	—	—	—	—	—	—	—	—	—	Newhaven.
—	—	—	—	13	12	5	30	—	—	30	Plymouth.
—	—	—	—	—	—	—	—	—	—	—	Preston.
—	—	—	—	1	—	—	1	—	—	419	Silloth.
—	—	—	—	—	—	1	1	—	—	1	Southampton.
—	—	—	—	6	22	8	36	—	—	1,431	Stranraer.
—	—	—	—	—	—	—	—	—	—	—	Swansea.
—	4	4	—	403	1,058	613	2,074	—	—	11,603	TOTAL.

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the  
showing the PORTS of

PORT IN IRELAND.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
BELFAST, .	—	26	—	—	26	—	—	—
DUBLIN, .	422	43	—	—	465	204	—	204
TOTAL, .	422	69	—	—	491	204	—	204

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the  
showing the PORTS of DEBARKATION

PORT IN ISLE OF MAN.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
DOUGLAS, .	422	69	—	—	491	204	—	204

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the  
showing the PORTS of

PORT IN IRELAND.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
BELFAST, .	—	—	—	—	—	—	—	—
DUBLIN, .	—	—	—	—	—	—	—	—
TOTAL, .	—	—	—	—	—	—	—	—

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the  
showing the PORTS of EMBARKATION

PORT IN ISLE OF MAN.	CATTLE					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
DOUGLAS, .	—	—	—	—	—	—	—	—

ISLE OF MAN during the Three Months ended 31st December, 1915,  
EMBARKATION in IRELAND.

SWINE.			Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	PORT IN IRELAND.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	—	—	—	—	—	26 669	BELFAST. DUBLIN.
—	—	—	—	—	—	—	—	—	—	695	TOTAL

ISLE OF MAN during the Three Months ended 31st December, 1915,  
in the ISLE OF MAN.

SWINE.			Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	PORT IN ISLE OF MAN.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	—	—	—	—	—	695	DOUGLAS.

ISLE OF MAN during the Three Months ended 31st December, 1915,  
DEBARKATION in IRELAND.

SWINE.			Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	PORT IN IRELAND.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	1	—	1	—	—	1	BELFAST. DUBLIN.
—	—	—	—	—	1	—	1	—	—	1	TOTAL.

ISLE OF MAN during the Three Months ended 31st December, 1915,  
in the ISLE OF MAN.

SWINE.			Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	PORT IN ISLE OF MAN.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	1	—	1	—	—	1	DOUGLAS.



## COASTING AND

RETURN OF THE NUMBER OF ANIMALS SHIPPED to and from Places in  
the Places of Embarkation

IRISH PORTS.	CATTLE.					SHEEP.			SWINE.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.	Fat.	Stores.	Total.
Cork to Aghada Pier, .	—	—	—	—	—	—	—	—	—	—	—
" to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
" to Spike Island, .	—	—	—	—	—	—	—	—	—	—	—
" to Queenstown, .	—	—	—	—	—	—	—	—	—	—	—
" to Waterford, .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	—	—	—	—	—	—	—	—	—	—
Aghada Pier to Cork, .	—	—	—	—	—	—	—	—	—	—	—
Belfast " .	—	—	—	—	—	—	—	—	—	—	—
Spike Island " .	—	—	—	—	—	—	—	—	—	—	—
Queenstown " .	—	—	—	—	—	—	—	—	—	—	—
Waterford " .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	—	—	—	—	—	—	—	—	—	—
Waterford to Ballyhack, .	—	1	—	—	1	—	—	—	—	—	—
" to Belfast, .	—	105	—	4	109	2	—	2	—	16	16
" to Duncannon .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	106	—	4	110	2	—	2	—	16	16
Ballyhack to Waterford, .	1	27	—	—	28	33	—	33	9	—	9
Dublin to Belfast, .	19	—	—	—	19	61	—	61	—	—	—
Duncannon to Waterford, .	30	20	—	—	50	10	—	10	190	—	190
Kilrush to Limerick, .	—	22	—	—	22	—	—	—	576	—	576
Kildysart " .	—	—	—	—	—	—	—	—	—	—	—
Glin, " .	—	—	—	—	—	—	—	—	—	—	—
Portumna, " .	—	—	—	—	—	—	—	—	—	—	—
Tarbert, " .	—	—	—	—	—	—	—	—	—	—	—
Kilkee, " .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	22	—	—	22	—	—	—	576	—	576
Milford to Portrush, .	—	—	—	—	—	—	—	—	25	—	25
Larne to Belfast, .	—	13	—	—	13	—	—	—	—	—	—
Londonderry to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Moville to Londonderry, .	—	—	—	—	—	—	—	—	—	—	—
Ballina to Sligo, .	—	—	—	—	—	—	—	—	—	—	—
Belmullet " .	49	—	—	—	49	—	—	—	1,378	—	1,378
Westport " .	—	—	—	—	—	—	—	—	—	—	—
Total, .	49	—	—	—	49	—	—	—	1,378	—	1,378
Sligo to Belmullet, .	—	—	—	—	—	—	—	—	—	—	—
Milford to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Mulroy to Portrush, .	—	—	—	—	—	—	—	—	12	—	12
Dublin to Waterford, .	—	—	—	—	—	—	—	—	—	—	—
Leitbeg to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Total, .	99	138	—	4	291	106	—	106	2,190	16	2,206

## INLAND NAVIGATION.

Ireland during the Three Months ended 31st DECEMBER, 1915, showing and Debarkation

Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	IRISH PORTS.
	Stallions.	Mares.	Geldings.	Total.				
—	—	—	—	—	—	—	—	Cork to Aghada Pier.
—	—	—	—	—	—	—	—	" to Belfast.
—	—	—	—	—	—	—	—	" to Spike Island.
—	—	—	—	—	—	—	—	" to Queenstown.
—	—	—	—	—	—	—	—	" to Waterford.
—	—	—	—	—	—	—	—	Total.
—	—	—	—	—	—	—	—	Aghada Pier to Cork.
—	—	—	—	—	—	—	—	Belfast       "
—	—	—	—	—	—	—	—	Spike Island "
—	—	—	—	—	—	—	—	Queenstown "
—	—	—	—	—	—	—	—	Waterford   "
—	—	—	—	—	—	—	—	Total.
—	—	—	—	—	—	—	1	Waterford to Ballyhack.
—	—	2	—	2	—	1	130	" to Belfast.
—	—	2	—	2	—	1	131	" to Duncannon.
—	—	—	—	—	—	—	—	Total.
—	—	—	—	—	—	—	70	Ballyhack to Waterford.
—	—	—	—	—	—	—	80	Dublin to Belfast.
—	—	—	—	—	—	—	250	Duncannon to Waterford.
—	—	—	—	—	—	—	598	Kilrush to Limerick.
—	—	—	—	—	—	—	—	Kildysart   "
—	—	—	—	—	—	—	—	Glin       "
—	—	—	—	—	—	—	—	Portumna   "
—	—	—	—	—	—	—	—	Tarbert     "
—	—	—	—	—	—	—	—	Kilkee      "
—	—	—	—	—	—	—	598	Total.
—	—	—	—	—	—	—	25	Milford to Portrush.
—	—	—	—	—	—	—	13	Larne to Belfast.
—	—	—	—	—	—	—	—	Londonderry to Mulroy
—	—	—	—	—	—	—	—	Moville to Londonderry.
—	—	—	—	—	—	—	—	Ballina to Sligo.
—	—	—	—	—	—	—	1,427	Belmullet   "
—	—	—	—	—	—	—	—	Westport   "
—	—	—	—	—	—	—	1,427	Total.
—	—	—	—	—	—	—	—	Sligo to Belmullet
—	—	—	—	—	—	—	—	Milford to Mulroy.
—	—	—	—	—	—	—	12	Mulroy to Portrush.
—	—	—	—	—	—	—	—	Dublin to Waterford
—	—	—	—	—	—	—	—	Leitbeg to Mulroy.
—	—	2	—	2	—	1	2,606	Total

RETURN of the NUMBER of HORSES EXPORTED from IRELAND through GREAT BRITAIN to the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 31ST DECEMBER, 1915, showing the Ports of Embarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast, . . . . .	—	—	—	—
Cork, . . . . .	—	—	—	—
Dublin, . . . . .	—	2	—	2
Dundalk, . . . . .	—	—	—	—
Greenore, . . . . .	—	—	—	—
Waterford, . . . . .	—	—	—	—
Wexford, . . . . .	—	—	—	—
Total, . . . . .	—	2	—	2

RETURN of the NUMBER of HORSES IMPORTED into IRELAND through GREAT BRITAIN from the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 31ST DECEMBER, 1915, showing the Ports of Debarcation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast, . . . . .	—	—	—	—
Dublin, . . . . .	—	—	—	—
Total, . . . . .	—	—	—	—

RETURN of the NUMBER of HORSES EXPORTED from IRELAND direct to FOREIGN COUNTRIES during the THREE MONTHS ended 31ST DECEMBER, 1915, showing the Ports of Embarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Cork, . . . . .	—	—	—	—
Limerick, . . . . .	—	—	—	—
Total, . . . . .	—	—	—	—

## DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of SWINE FEVER, and NUMBER of SWINE returned as having been SLAUGHTERED in Ireland, under the Diseases of Animals Act of 1894, in the undermentioned period, by Order of the Department.

Quarter ended	SWINE FEVER.	
	Outbreaks confirmed.	Swine Slaughtered as Diseased or as having been Exposed to Infection.
31st December, 1915, . . . .	53	257

NUMBER of OUTBREAKS reported as having taken place, and NUMBER of ANIMALS returned as having been Attacked by ANTHRAX, GLANDERS and FOOT AND MOUTH DISEASE in Ireland in the undermentioned period.

Quarter ended	ANTHRAX.		GLANDERS (including Farcy).		Foot and Mouth Disease.	
	Outbreaks Reported.	Animals Attacked.	Outbreaks Reported.	Animals Attacked.	Outbreaks Reported.	Animals Attacked.
31st Dec., 1915,	2	6	—	—	—	—

NUMBER of CASES of RABIES in Dogs in IRELAND during the undermentioned period.

Quarter ended	Number of Cases.
31st December, 1915, . . . . .	—

NUMBER of OUTBREAKS reported as having taken place, and NUMBER of ANIMALS returned as having been attacked by SHEEP-SCAB and PARASITIC-MANGE in Ireland in the undermentioned period.

Quarter ended	SHEEP-SCAB.		PARASITIC-MANGE.	
	Outbreaks Reported.	Sheep Attacked.	Outbreaks Reported.	Animals Attacked.
31st Dec., 1915,	105	808	15	20

Veterinary Branch,  
Department of Agriculture and Technical Instruction  
for Ireland, Dublin.

ACCOUNT showing the QUANTITIES of certain kinds of AGRICULTURAL  
into Ireland during each WEEK

ARTICLES	WEEK ENDED				
	2nd October	9th October	16th October	23rd October	30th October
ANIMALS LIVING—					
Horses, . . . . No.	—	—	—	—	—
FRESH MEAT—					
Beef (including refrigerated and frozen), . . . cwt.	—	—	—	—	—
Mutton, " " " "	—	—	—	—	—
Pork, " " " "	—	—	—	—	—
Unenumerated " " " "	—	—	—	—	—
SALTED OR PRESERVED MEAT—					
Bacon, . . . . cwt.	—	—	—	—	—
Beef, " " " "	—	—	—	—	—
Hams, . . . . " "	—	—	—	—	—
Pork, . . . . " "	—	—	—	—	—
Meat, unenumerated, Salted " "	—	—	—	—	—
Meat, preserved otherwise than by salting (including tinned and canned), . . . cwt.	—	228	—	—	—
DAIRY PRODUCE AND SUBSTITUTES—					
Butter, . . . . cwt.	—	—	—	—	—
Margarine, . . . . "	—	—	—	2	—
Cheese, . . . . "	—	—	—	—	—
Milk, Condensed, . . . "	580	25	—	—	14
" Cream, . . . . "	—	—	—	—	—
" Preserved, other kinds "	—	—	—	—	—
EGGS, . . . . gt. hunds.	—	—	—	—	—
LARD, . . . . cwt.	—	—	—	—	—
CORN, GRAIN, MEAL AND FLOUR—					
Wheat, . . . . cwt.	98,200	48,500	165,400	—	56,400
Wheat Meal and Flour, . . "	6,900	17,500	29,300	—	25,700
Barley, . . . . "	—	—	—	97,600	300
Oats, . . . . "	—	—	—	—	—
Peas, . . . . "	—	—	—	—	—
Beans, . . . . "	—	—	—	—	—
Maize, or Indian Corn, . . "	291,600	—	75,900	214,600	222,300
FRUIT, RAW—					
Apples, . . . . bunches	—	—	—	—	—
Bananas, . . . . cwt.	—	—	—	—	—
Currants, . . . . "	—	—	—	—	—
Gooseberries, . . . . "	—	—	—	—	—
Pears, . . . . "	—	46	—	—	—
Plums, . . . . "	—	—	—	—	—
Grapes, . . . . "	—	—	—	—	—
Lemons, . . . . "	—	—	—	—	—
Oranges, . . . . "	—	—	—	—	—
Strawberries, . . . . "	—	—	—	—	—
Unenumerated, . . . . "	—	—	—	—	—
HAY, . . . . tons,	—	—	—	—	—
STRAW, . . . . "	—	—	—	—	—
MOSS LITTER, . . . . "	—	—	—	—	—
HOPS, . . . . cwt.	—	—	—	—	—
VEGETABLES, RAW—					
Onions, . . . . bushels,	—	232	—	—	—
Potatoes, . . . . cwt.	—	—	—	—	—
Tomatoes, . . . . "	—	—	—	—	—
Unenumerated, . . . value £	—	—	—	—	—
VEGETABLES, DRIED, . . cwt.	—	—	—	—	—
Preserved by Canning, . . "	703	—	—	—	—
POULTRY AND GAME, . . value £	—	—	—	—	—

\* This Table is confined to the Imports of certain kinds of Agricultural Produce into to a request from this Department kindly consented to separate the Irish Imports (direct) form of Weekly Returns



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Winter Egg Records, 1915-16—Official Documents—Notes  
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SIXTEENTH YEAR

No. 3

APRIL, 1916.



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## NOTICE.

*Communications respecting the literary contents of this JOURNAL should be addressed to the Superintendent of the Statistics and Intelligence Branch, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin.*

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## THE MANAGEMENT OF DAIRY COWS.

Dairying, with its subsidiary industries, calf rearing and pig fattening, constitutes the most important branch of Irish agriculture. Our dairying industry as at present conducted is capable of considerable development, and that there is scope for much improvement in the care and management of milch cattle in the country cannot be questioned.

It is not claimed that the observations embodied in the following pages embrace every aspect of the subject, but it is hoped that they may stimulate thought and inquiry among those who at present neglect many details connected with the business of milk production.

Success or failure in dairying mainly depends upon the class of cows kept for breeding. To maintain our great industry in stores and fat cattle it is essential **Best Type of Cow.** to have cows that will return a reasonable profit as dairy animals, and which will at the same time produce calves that can be converted into beef with satisfactory results. With this object in view reliance should be placed upon cows of the Shorthorn type; no other breed of cattle is so well adapted to the needs of this country.

It is important, however, that as regards breed, size and constitution, the cows should be adapted to local conditions. It would be courting disaster to attempt to maintain large-framed, well-bred Shorthorn cows in many of the poorer districts, where the grazing is inferior and the winter conditions are such as demand extreme hardiness of constitution. In the poorest districts Kerry cows may serve a useful purpose, but, having regard to the production of store cattle which is everywhere practised, small, hardy cows of the Shorthorn type are, generally, the most suitable.

To obtain the greatest profit it is necessary to improve the milking capacities of individual cows, and to retain none whose yield of milk, either as regards quantity or quality, falls below a certain standard. The minimum yield should be such as will secure a fair profit, after allowing for the cost of feeding and incidental charges, such as depreciation, interest on capital, risk, etc.

Many examples might be quoted to show the need for fixing a standard, and for disposing of all cows which fall below that standard as regards milk yield. One such example will, for the present, suffice. On a farm in the South of Ireland where milk records are kept the yields from the five best and the five worst cows in the herd in 1914 were as follows:—

Average yield of 5 best cows 702 galls. Average per cent. of  
butter fat 8.65  
Average yield of 5 worst cows 433 galls. Average per cent. of  
butter fat 3.25

In calculating the above averages all cows were omitted whose lactation periods were abnormally long, and also the young cows which had produced only one or two calves.

Reference to these figures shows that the milk from the heaviest yielding cows was richer in butter fat than the milk from the cows which gave low yields. This is not an uncommon experience, but it is contrary to the belief of many farmers. There is no definite relation between the yield of milk and the amount of butter fat it contains. The heaviest milking cow in a herd is just as likely to yield rich milk as the one that gives the smallest yield.

It is false economy to retain a low yielding cow because she breeds good stores; the value of 300 gallons in milk, which may represent the difference between a good milker and a bad one, is, as a rule, greater than the difference in value between a good and a bad store beast.

Before the unprofitable cows can be disposed of they must first be identified. This can be satisfactorily accomplished only by means of milk records.

The importance of keeping a record of the milk yields of the different cows in a dairy herd can scarcely be over-estimated. Where it is desirable to determine the exact quantity, the milk must be weighed at each milking night and morning during the whole of the lactation period. For all practical purposes, however, it will suffice to weigh the milk every seventh day, care being taken to see that the cows are milked at the same hour each day. The approximate total yield of milk for the year or for the lactation period can thus be determined by multiplying the total of the weekly weighings by seven. In order to ascertain the yield of butter fat the milk of each cow should also be tested at regular intervals.\* After a fair trial any cow that is found not to be paying her way should be disposed of.

Here it may be remarked that the custom which is so prevalent in many parts of the country of selling the best cows because they will realise a pound or two extra cannot be too strongly condemned. These good cows are for the most part either shipped out of the country or bought for town dairies out of which the majority are sold fat at the end of the first season.

To grade up a herd of dairy cows a bull of a good milking strain should be used, and only heifers of the best milking dams kept

\* See article on Cow Testing and its Advantages; JOURNAL, Vol. XVI., No. 1, and the Department's Leaflet No. 16.

for breeding. Even when this course is followed disappointments will occur as some of the heifers will not turn out as well as expected. By careful breeding and by weeding out unprofitable cows the milking capacity of our dairy cows could be greatly improved. In Canada, for example, the milk yield per cow in herds, of which records have been systematically kept, has been increased by 245 gallons per annum, and in Sweden by 200 gallons. What has been accomplished in other countries should not be impossible in Ireland.

Next in order of importance to having the right class of cow comes the question of proper and economic feeding.

**Feeding.** The system followed must of necessity vary with local conditions. No hard and fast rule can be laid down for general adoption. One important point is that the cows should be in good thriving condition when due to calve. The feed during the period when spring calving cows are dry will consist chiefly of hay in the grazing districts, and of roots and oaten straw in the tillage districts. If any particular cow in the herd is not doing as well as is desirable, a daily allowance of two or three pounds of crushed oats, maize meal, or other food of a similar nature, if cheaper, should be allowed for six weeks or two months before calving.

If cows are allowed to become low in condition at the time of calving part of the food given afterwards will be used to build up the body at the expense of the milk yield. The difference in the milk yield of a cow calving in good condition, and the same cow calving, when partially emaciated, has been estimated at no less than 100 gallons for the season. After calving, the amount of cake and meal fed should be regulated by the yield of milk as determined by the weekly weighings, and by the price realised for the produce,

The custom of feeding all the cows in a herd alike, irrespective of the yield of milk, is a source of considerable loss. The capacity of every individual cow for the production of milk is limited. The liberal use of concentrated foods may increase the yield of milk to a certain extent, but it will not convert a bad milker into a good one.

On the other hand, it will generally pay to give a good milker a reasonable amount of cake and meal. Moreover, unless such an animal is well fed she will "milk herself away." It therefore follows that the quantity of cake or meal should be regulated by the yield of milk, the heavy milkers getting an extra supply.

Another—and perhaps the most important—factor that should determine the quantity of cake or meal fed is the price realised for the produce. In the case of town dairies where the milk is

sold at retail prices, and the cows are fattened at the same time, it is not only necessary, but it is profitable to feed well. On the other hand, where butter is made and the buttermilk consumed on the farm, or where the milk is sent to a creamery, the feed will require to be on a much more economical scale.

In feeding milch cows, as well as other animals, there is a point of "diminishing returns," i.e., the point where, when extra food is supplied, the increase in the value of the produce is insufficient to defray the extra cost of the food. In the case of milch cows this point of "diminishing returns" depends to a large extent on the price realised for the produce. For example, if for an extra 3lb. of meal, costing say 2d., a cow gives an extra quart of milk, which is sold at 4d. or even 3d., a good profit is obtained, but if the milk is sent to a creamery and only realises 1½d., such extra feeding results in a serious loss.

Whatever profit may be derived from feeding cake or meal to cows when they are in full milk shortly after calving, it is very questionable if it pays under ordinary conditions to try to extend the milking period by the liberal use of cake and meal when cows are beginning to go dry.

A mistake is frequently made in continuing to draw cows (it can scarcely be called milking) when they are almost dry, and thereby reducing their condition. In these circumstances it is more profitable to put the cows dry altogether and allow them a moderate rest so that they may commence the succeeding lactation period under the most favourable conditions. As already stated, no hard and fast rule can be laid down as regards either the kind or quantity of food to use. So much depends on the home-grown produce at the farmer's disposal, the relative market price of the different feeding stuffs, the yield of each individual cow and the price realised for the produce.

In discussing the question of feeding, cows may be conveniently divided into autumn and spring calvers. In **Time of Calving.** the case of autumn calvers, for the first week or so after calving bran mashes should be freely used.

Afterwards, during winter and early spring, when the cows are mainly dependent on hand feeding the following ration is suggested :—

- 3 to 5 stones roots
- 3 to 6lb cake and meal
- 1 to 1½ stones hay or oaten straw.

The cake and meal mixture might be made up of equal parts of decorticated cotton cake, crushed oats, bran and dried grains. Ground-nut cake, Soya cake, palm-nut cake, cocoanut cake or

bean meal could replace the decorticated cotton cake, and barley or maize meal the crushed oats.

The quantity of roots to be given will depend on the supply at the farmer's disposal. A test carried out at the Agricultural Station, Clonakilty, showed that when the quantity of roots fed was between 3 and 6 stones per day, one stone of roots could be replaced by 11lb. of a mixture of cake and meal consisting of equal parts decorticated cotton cake, maize meal and crushed oats without the yield of milk being reduced. When roots are limited, the quantity of dried grains and bran should be increased.

In the spring, while keeping up the supply of bulky foods, it may be advisable to reduce the concentrated foods to such cows as show an appreciable shrinkage in their milk yields.

Where there is not a sufficient supply of roots to carry the cows over till the grass season, catch crops should be grown for the purpose of providing the necessary green food. When grass becomes plentiful hand feeding may be wholly or partly discontinued unless where there is a tendency to scour, when undecorticated cotton cake, or a mixture of equal parts of this cake and dried grains, may be fed at the rate of 2lb. per head per day.

If the cows are allowed a rest of about two months they will put on flesh if grazed on fairly good pasture, and will be in much better condition to start the following season than cows that calve in the spring and are fed on hay, or roots and straw, even when allowed a much longer period of rest.

The treatment after calving in the case of spring calvers, and as long as the cows are mainly dependent on house feeding, should be much the same as for autumn calvers. For spring calvers a supply of succulent food, such as roots or catch crops, for use from the time the cows calve until there is sufficient grass available, is of the utmost importance.

The question as to whether it pays to give cake or meal to spring calvers when on the grass depends largely on the quality of the pasture, the price realised for the milk, and the yield of each cow. On first-rate pastures there will, as a rule, be no necessity to provide hand feeding. Where the pasture is of fair average quality and the milk is sold at creamery prices, it is doubtful if it is profitable to feed cake or meal indiscriminately to all cows in the herd; at the same time it will probably pay in such a case to give a daily allowance of 2 or 3lb. of concentrated foods to the heavy milkers.

When the quality of the grass begins to deteriorate in autumn a start should be made with the feeding of cabbages or other green food specially grown for this purpose. When the cows are housed at night the feeding should consist chiefly of cabbages, or roots and hay, or oaten straw, preferably the former. As already stated, it is very questionable if it pays to feed cake to spring calvers at this

season of the year unless where retail city prices are obtained for the milk.

Where cows are grazed on inferior pasture much better financial returns could often be obtained from the application of basic slag or superphosphate to the land than by the feeding of concentrated foods to the cows in summer and autumn. The use of suitable artificial manures greatly improves poor pastures, both as regards the quantity and quality of the herbage, with the result that the flow of milk is increased.

The time of calving has a considerable influence on the yield of milk. The best season, so far as the total yield is concerned, is late autumn and early winter. The principal reason for this is that cows that calve at this season make a second "spring" in the month of May when there is a plentiful supply of young fresh grass, and go up in their yield instead of falling off as is the case with spring calvers at a similar stage of their lactation period. Thus a cow that calves at the beginning of October will be in the 8th and 9th month of her lactation period in May or June. A good milker will then give as much milk as she did in the 4th and 5th months, i.e., in January and February. The corresponding period for a cow that calves on the 1st of April will be November and December, when she will probably be "dry" unless hand feeding is provided on a liberal scale.

The extra yield of milk in the case of the autumn calvers is also due in a lesser degree to the longer milking period, and the better condition of the cows at the time of calving. Cows that calve in October or November should milk at least one month longer than those that calve in March or April. Against the extra increase in milk has to be set the extra cost of feeding. The principal difference in tillage districts will be in the quantity of concentrated foods required. In grazing districts winter dairying would entail a complete change in the system of farming at present adopted. To be successful succulent foods, such as roots or green food of some description, or ensilage, would require to be provided.

In districts where there is a plentiful supply of distillers' or brewers' grains, the quantity of roots might be considerably reduced. The grains encourage the flow of milk, but where fed in large quantities without a liberal allowance of cake or meal, they are apt to give the milk a poor, bluish colour, and may possibly tend to reduce the quality.

Whatever may be said for or against autumn and spring calving, there is no doubt that the most unprofitable season for a cow to calve is from June to August, and probably September. When a cow calves at this season hand feeding has to be resorted to after a short interval and has to be continued right through the winter. In the month of May such a cow will be either dry or too far advanced

in her lactation period to derive any benefit from the young grass, and will be dry at the time of the year when milk is produced at the minimum cost.

In order to produce the maximum quantity of milk it was considered necessary up to a few years ago to keep

**Housing and General Management.** cows that were milking during winter at a temperature of somewhere about 60°F. Recent investigations, however, have shown that there

is no necessity for this, and that cows are healthier and produce quite as much milk when kept at a much lower temperature. In any case care should be taken to see that the byre is well lighted and thoroughly ventilated, but kept free from draughts. When the weather is favourable the cows should be allowed out for exercise, but they should not be allowed to remain in the open for hours in all sorts of weather, nor up to their knees in mud.

Dark, badly ventilated houses are nothing more or less than breeding grounds for disease, more especially of tuberculosis. The floor, passage and manure channel of the byre should be made of rough concrete so as to allow the place to be washed out at regular intervals.

As milk is very apt to be contaminated with dirt of every description (both living and dead), the byre should be kept thoroughly clean, the walls should also be limewashed twice a year, the cows regularly groomed, and the udders wiped clean with a cloth before milking. The milkers themselves should also exercise the greatest care as regards cleanliness in their own persons, and always wash their hands before milking each cow.

Cows should not be overdriven at any time, and during the process of milking they should be handled as gently as possible. While thorough, quick and careful milking tends to encourage the flow of milk, rough treatment or careless and dilatory milking has the opposite effect, and may make the cow hold up part of her milk. When a cow is not milked perfectly "dry" at each milking the yield gradually falls off, with the result that not only is the daily yield less, but the milking period is thereby shortened, and the total quantity produced during the season considerably reduced.

Udder troubles may also arise and the cow lose one or more of her quarters, which greatly reduces her value. The difference between efficient and inefficient milking may in itself mean the difference between a profit and a loss.

JAMES L. DUNCAN.



## TOBACCO GROWING IN IRELAND.

### THE EXPERIMENTS IN 1915.

\* \* *An article dealing with the experiments in Tobacco-growing in Ireland, conducted under the auspices of the Department up to the end of the year 1908, appeared in the issue of the Department's JOURNAL for January, 1909—Vol. IX., No. 2. Reprints of the article, with illustrations, have been issued in pamphlet form and may be obtained free of charge on application. Further articles, giving particulars of the progress of the experimental work in each of the years 1909 to 1914, inclusive, appeared in the issues of the JOURNAL for January, 1910 (Vol. X., No. 2), January, 1911 (Vol. XI., No. 2), April, 1912 (Vol. XII., No. 3), January, 1913 (Vol. XIII., No. 2), January, 1914 (Vol. XIV., No. 2), and April, 1915 (Vol. XV., No. 3), respectively. The paper below gives some account of the experiments conducted in 1915.*

Complete returns regarding the large scale experiments, conducted under the supervision of the Department, which concluded in 1913, are not yet available, but it is hoped that a final report on this series of experiments will be published in an early issue of this JOURNAL.

These remarks also apply to the Small Growers' scheme which was started in 1910 for the purpose of enabling farmers with small areas of land to experiment with tobacco growing. The current scheme of tobacco experiments, covering a period of ten years and financed out of the Development Fund was inaugurated in 1914.

The main conditions of this scheme are given in the article on the subject of Tobacco Growing in Ireland which appeared in the issue of the Department's JOURNAL for April, 1915. Reprints of the article in pamphlet form have been issued, and may be obtained free of charge on application.

The number of growers, the total areas cropped in 1915 at the different centres where experiments under the Scheme have been instituted, and the quantity of tobacco produced at each centre are as follows :—

Re-handler.	Centre.	No. of Growers.	Acres.	Preliminary Packed Wt. lb.
Earl of Dunraven, K.P.	{ Adare, Co. Limerick } { Mullaerew, King's Co. }	60	106½	67,300 (est.)
Col. Sir N. Everard, Bart.	Randlestown, Co. Meath	71	111½	60,630
Wexford Tobacco Growers' Society	Tagoat, Co. Wexford	6	7½	3,977

Besides those carrying out tobacco experiments under the supervision of the Department, four other persons in Ireland were licensed to grow approximately  $4\frac{1}{2}$  acres.

### *Growing.*

The weather was, on the whole, very favourable for seed beds and for preparation of the land.

**Weather.** A severe frost on 14th May damaged a few early plantings in Co. Meath, and a very dry period between 20th May and 25th June seriously interfered with planting operations. In the fields growth was delayed in June by drought and was further retarded by the almost continuously wet and cool period which extended from 25th June to 17th August. The generally favourable weather which followed and continued until early October was not sufficiently dry and warm to enable the tobacco to recover and produce a normal crop. Severe frost on the 28th, 29th and 30th September had the effect of lowering the yield and quality of the tobacco on a number of plots at the growing centres in Co. Meath and King's County.

Since the purpose of the new re-handling scheme is to prepare a large number of small crops for market as one crop, the experimenters devoted almost their entire acreage to the production of pipe tobacco mainly from one variety. For pipe tobacco Copper King was the variety generally planted, though at one centre a shortage of seed necessitated the planting of several acres with Irish Blue Pryor. At another centre Kentucky Black and Burley were tested again for the production of pipe tobacco. One experimenter grew one acre of Giourkioi for the production of cigarette tobacco of the Turkish type, and another experimenter grew  $4\frac{1}{2}$  acres of Irish Gold for the production of a cigarette tobacco of the Virginia type. In addition to the six varieties which were grown on a commercial scale tests were conducted on a small scale at one centre with five varieties and six hybrids. The results of experiments with varieties were as follows:—

**For Roll and Plug.**—The unfavourable season prevented the perfect development of varietal characteristics, with the result that comparative tests of Copper King and Kentucky Black were inconclusive. Irish Blue Pryor, however, showed its inferiority.

**Bright Pipe Cutters.**—Broad Leaf Burley, which has been repeatedly grown for the production of brown wrappers for plug and roll, again proved more suitable for the production of a coloury pipe cutter than for wrappers. In King's County and Co. Limerick a considerable quantity of semi-bright leaf suitable for pipe cutters was produced from Copper King. This fact was due to the curing,

in the ordinary manner, of leaves which had been reduced in size, thickness, and gum by the effects of the weather.

*Cigarette Tobacco*.—Irish Gold, which was planted at only one centre, failed almost completely through an attack of root-rot. One acre of Giourkioi, a Turkish variety, gave slightly better results than in previous years. This was effected by curing most of the leaves of the plants on the stalk instead of by plucking and stringing them in the usual manner. None of the varieties or hybrids grown experimentally were superior to those grown commercially.

The season of 1915 was remarkably free from strong winds during the time the plants were in the field. This was a fortunate circumstance, in view of the exposed situation of some fields. Jerusalem Artichokes, which have proved to be the most desirable shelter plant yet tried, were not planted as generally as circumstances ordinarily require.

The exceptional weather conditions afforded a severe test of the different types of soil. Compact soils proved most unsuitable. In some cases the compactness was due merely to lack of humus and fibre, and in other cases the heavy top-soil was underlaid by stiff, retentive sub-soil. Compact soils are often prepared imperfectly and with much difficulty and loss of moisture, in which case they withstand drought badly. Excessive rainfall, on the other hand, causes soils of this nature to become so sodden and close as to exclude the air from the plant roots. Moor land had a decided advantage during the dry weather, and many fields of this type of soil withstood the wet weather very well, but the rather premature frost at the end of September was most severe on tobacco on moor land. This fact is due to its low elevation, and to the succulent growth which moor land produces.

The weather in May was very favourable for the preparation of land, and the effects of the drought which followed were rendered less harmful by this circumstance. **Preparation of Land, Manuring and Rotation.** Owing to the increase in the price of artificial manure, due to the conditions prevailing on account of the war, the experimenters reduced the application per acre, wherever possible, to 8 cwts. of the standard No. 2 formula. As the season was not a favourable one for growth it is doubtful if this policy was a wise economy. Although the growing of a catch crop of rye between crops of tobacco, and the ploughing in of the rye as manure for the latter crop, would have afforded a ready means of saving manure, few growers availed themselves of the opportunity of doing so. The beneficial effects upon succeeding crops in the rotation to be derived from the growing of tobacco

were shown in Co. Meath, where the two meadows which realised the highest prices at auctions in the district had been laid down with corn after tobacco.

The difficulties in connection with seed beds were due, primarily, to insufficient ventilation and watering and to

**Seed Beds.** the use of soil which was infected by root-rot fungus and full of weed seeds. As a result, many plants were scorched or killed in sunny weather, or injured or destroyed in the process of weeding, or where root-rot was prevalent, the destruction of plants was still more serious. With a few exceptions, there was an ample supply of plants.

Transplanting in the field was begun on 12th May, and was not completed until 1st July. Much replanting was

**Planting.** necessary on account of drought, wire-worm and root-rot. Tobacco planted before 15th May met with a severe frost, as is usually the case. On the other hand, growers who were not ready to plant in May experienced delays and losses occasioned by planting in the drier and warmer weather of June. Those who waited for rain only increased their difficulties. Experience teaches that every effort should be made to plant tobacco in the field near the end of May. With this in view soil moisture should be conserved and, if the weather be dry and sunny, plants should be transplanted in the cool of the evening.

The dry weather of June afforded every opportunity for destroying the first growth of weeds after planting. In

**Cultivation.** cases where this was not done, the fields became very weedy during the prolonged wet period when cultivation was impossible. When the weather again became fine the land was so wet and other work was so pressing that many growers neglected to stir the soil and destroy weeds before the plants became too large to permit of final cultivation of the tobacco. In such cases the yield and quality of the tobacco were greatly reduced.

In a late season, such as that of 1915, it is highly important that topping and suckering should be attended to

**Topping and Suckering.** promptly in order to hasten maturity. Low topping also has the same effect. Judging by their practice, some of the growers do not appear to realise, fully, these facts.

Dry weather occurred at a period which would have been most favourable for ripening had it not been for the

**Ripening and Harvesting.** fact that the growth had been retarded by the unfavourable season to the extent of three weeks in some cases. As a result the tobacco had very little time in which to ripen, despite the favourable weather which

extended for six weeks from 17th August. Harvesting was, therefore, postponed on this account. The severe frost, however, of 27th, 28th, and 29th September damaged a portion of the crops of many growers and hastened the completion of the harvest. Most of the total crop was saved in favourable weather and with little difficulty on account of the light yield.

As the tobacco plants were in most cases undersized, practically no difficulty was experienced from overcrowding of the curing barns. For this reason any tobacco which was harvested at the beginning of the dry weather in September was cured with very slight expenditure of time and fuel. Where firing was frequent, the tobacco showed a tendency to cure semi-bright in colour. Tobacco which was even very slightly touched with frost gave trouble, as usual, in the curing. On account of the ease with which most crops were housed and the early stages of curing accomplished, few growers were inclined to finish the curing of their tobacco in hollow piles. This proved to be a mistaken policy, as the drying of the midribs of the leaves was thereby prolonged, and the damp, cold weather of October and November greatly magnified the risks from mould and caused an increase in the expenditure on labour and fuel.

Wire-worm again did great damage in the tobacco fields of several small holders whose lands were until recently part of a large grazing ranch which had been in grass for an indefinite period. One of the experimenters who planted a large acreage of tobacco on fresh land in order to avoid fields infested with root-rot also had serious trouble with wireworm. The disease known as root-rot was more widespread than heretofore. Approximately 40 acres at one centre and 20 acres at another were more or less affected, and the yield greatly reduced thereby. The disease was in all cases traceable to the seedbed, where it is inclined to develop if infected soil is used. In order to avoid the disease it is necessary to select seed-bed soil in which the vegetable matter is well decayed or in a healthy state, and to sterilise each year the seed-bed frames and the site by spraying with a two per cent. solution of copper sulphate.

#### **Pests and Diseases.**

#### *Re-handling.*

The term "re-handling" embraces the operations of receiving and purchasing cured tobacco from growers and of grading, sweating, re-drying, packing, maturing and marketing the tobacco. A person who performs these functions for those who merely grow and cure tobacco is called a re-handler, and it is along these lines that the new experiment has been started with a view to thus specialising and conforming to the accepted practice in competitive tobacco-growing countries.

There is need for more care and system in the delivery of tobacco by the growers to the re-handlers, and also as regards the subsequent storage of the tobacco until such time as it can be graded. As a rule, the growers have packed the tobacco in bundles which are improperly made and contain too much moisture. The re-handlers have found it difficult to devise a satisfactory system for dealing with tobacco in such condition.

The re-handling of the 1914 crop had not been completed at the time the last report was published. At two centres the methods of dealing with the 1914 crop were the same as those followed in the case of crops grown under the old scheme of experiments which terminated in 1913. At the third centre an automatic, continuous, re-drying and re-ordering machine with supplementary equipment, such as is generally used by American re-handlers, was installed for use in packing the tobacco in the dry order which British markets require. As the method of re-handling by this machinery, which is known as the Proctor system, was proved to be quite suitable for the re-handling of Irish-grown tobacco in large quantities, a second machine was installed at the other large centre in 1915. The Wexford Tobacco Growers' Society, finding it uneconomic to re-handle the small quantity of tobacco grown for them, made arrangements in 1915 to have their tobacco re-handled at one of the large centres where a Proctor machine had been installed.

The method of re-handling by this machine is briefly as follows. The tobacco leaves are tied in hands as they are graded, and the hands are placed on six-foot sticks, which are passed through the machine on moving supports consisting of two endless chains. If desired, loose tobacco leaves may be laid on an endless web or "apron" which operates in the same manner as the rack formed by the two chains. The body of the machine, which is approximately 85 feet in length, and 8 feet in height and breadth, is divided into five sections by means of partitions and baffles. By strong currents of heated air the tobacco is thoroughly dried in the three first sections. It is cooled by a current of air in the fourth section, and in the fifth section it is moistened to the proper degree for packing by currents of air impregnated with steam. The operations of drying, cooling, and ordering are automatic and continuous, but require regulation and adjustment. The experience of the past two years indicates that a Proctor machine should be a very efficient and economic instrument in the preparation for market of Irish tobacco if the growing of the crop were on an extensive and permanent basis.

At all centres great difficulty was experienced in obtaining a full staff of efficient graders. This difficulty is due to the circumstances that (1) the re-handling stations are not near large centres of population, (2) the employment is temporary, and (3) the growers at this stage are not sufficiently experienced to grade, even partly, their

own crops. A slow rate of grading lowers efficiency to a considerable extent, for the reason that the machine must be run intermittently, which increases the running expenses and necessitates the temporary storing of considerable quantities of graded tobacco. No attempt was made to grade the 1915 crop for wrappers except by one re-handler, who selected 4,511 lbs. as wrapper leaf for use in his own factory. The remainder of the crop was graded for cutters and fillers, according to length and colour. At one centre, where there was little variation in the colour of the tobacco, only three main grades were made. At another centre where the tobacco was more variable in colour most of the growers' crops were divided into at least six main grades, in addition to frosted and scrap tobacco.

### *Marketing.*

With the increased production of tobacco in 1914, caused by the extension of acreage, the experimenters found it desirable, if not necessary, to sell a large proportion of their tobacco through brokers and merchants in the trade. In 1914 the preliminary packed weight of the tobacco grown on the total area of 218 acres was 211,547 lbs. Of this quantity a total of 160,789 lbs. has been sold at an average price of 5½d. per lb. The packing and bonding of the 1915 crop has only recently been completed, and none of it has been sold though attractive offers are being considered.

The twopence allowance in the duty on home-grown tobacco, which is intended to cover the cost to the grower of Excise supervision, was extended in 1915 to home-grown tobacco exported in bond. Previous to the granting of this export allowance, the sale of home-grown tobacco was virtually restricted to British markets, as it was not possible to export it without losing the benefit of the twopence allowance. Since the export allowance has been granted, the wider market thus afforded, together with conditions arising from the war, has considerably improved the market and prices for Irish-grown tobacco. Moreover, any tobacco which is sold in foreign markets will not be affected by the disadvantages which the increased duty imposes as regards excess moisture and low quality. On account of the increase of 50 per cent. in the tobacco duty every unit of moisture above the minimum allowance of 10 per cent. increases the amount of duty payable by three farthings on each pound of tobacco. The increased duty has also added to the difficulty of selling inferior grades, as it minimises any differences in price. At the present date it would appear that the prohibition of the importation of tobacco may strengthen the demand and increase the prices obtainable for Irish-grown tobacco.

## RAGWORT.

The object of this article is to call attention to some facts concerning the life history of the weed ragwort which have been discovered as a result of special investigations carried out in Ireland during the past few years and to discuss the best means of eradicating the weed.

### I.—LIFE HISTORY OF THE PLANT.

There are several kinds of "ragwort" which grow wild in Ireland, but the one with which this article deals is the commonest of them all and is known to botanists under the name of *Senecio Jacobaea L.* It has also several common names such as "ragweed," "boohalaun," "bulkishaun," "benweed," etc. It grows more or less commonly in all parts of the country, along waysides, in waste places, in pastures, and elsewhere. In several of the northern counties ragweed is so prevalent in many of the pastures, particularly in those newly laid down, that it cannot be otherwise regarded than as a noxious weed, depreciating to a considerable extent the grazing value of the land. In the more southerly and in the western counties the weed does not perhaps flourish to quite the same extent as in the north, although it may often be met with in considerable quantities in old pastures.

Ragwort is one of those plants which, in accordance with Part I. of the Weeds and Agricultural Seeds (Ireland)

**Ragwort a** Act, 1909, may be declared by the Department,  
**Noxious Weed.** with the consent of the Council of any county, to be a noxious weed in that county. The majority of the counties in Ireland have adopted Part I. of this Act, but in five of them ragwort is not on the list of plants scheduled as noxious weeds, while in some of the counties in which it is so scheduled considerable difficulty has often been experienced in persuading farmers to take steps to exterminate it. Various reasons have been given for this reluctance to regard the plant as a noxious weed and to deal with it accordingly, some of which may at once be dismissed as more or less trivial. Thus it cannot seriously be maintained, as some people assert, that the weed is harmless and does no injury whatever to the land, nor can the idea be entertained that it should not be destroyed because—as is alleged—its presence is an indication of good land! The visible persistence of the plant is a sufficient answer to those who say that if left alone it will die out naturally in a few years. Further, the view that if cut late in the season the upstanding cut stems are likely to be injurious to the feet of cattle need not be regarded as of serious importance.



Other reasons have been given for non-interference with the weed, however, which demand closer attention. One of these is founded on the assumption that the plant is a perennial, and that from the persistent roots fresh plants arise in the succeeding season as a result of cutting down the plant when in its flowering condition. A second is that cutting the plant when in flower to prevent seed formation is useless because the plant does not reproduce itself by seed at all.

It will at once be evident that these points lend themselves to experimental investigation, and answers were, therefore, sought and have been obtained to two simple questions, viz.: (1) Does ragweed produce viable seed? And (2) is ragweed a perennial plant?

The first question was soon answered, and in the affirmative.

Several lots of seed\* were collected in the autumn of 1913 from plants growing wild. The seeds were tested for germination at the Department's Seed

**Propagation by Seed.** Testing Station and gave good percentages of growth. Seed was sown in the open ground as well as in a box of soil, and it produced plenty of seedlings. It was observed that some of the seed germinated at once in the autumn; and the winter was passed in the seedling stage. Some of the seed, however, lay dormant over the winter and germinated during the following spring and summer. It may be regarded, then, as conclusively proved that ragwort does produce a plentiful supply of seed capable of growth. Moreover, as is well known, each seed of ragwort is provided with a tuft of hairs which renders it buoyant, and the wide distribution and dissemination of this weed over the country is the result of the ease with which these abundantly-produced seeds are spread far and wide by the agency of the wind. It is, therefore, evident that one of the most promising methods of keeping this weed in check is to prevent the formation and distribution of its seeds.

With regard to the second question, if botanical authorities be consulted, it is found that they are certainly almost unanimous in describing the plant as a perennial. Colgan, however, in his *Flora of County Dublin*, regards it, doubtfully, as a biennial. It will be apparent from what follows that the authorities, with the exception of Colgan, are wrong, for a study of the life history of the plant shows that, as far at least as Ireland is concerned, the plant behaves as a typical biennial, i.e., that it completes its entire life history within two seasons and then dies out.

\* Perhaps it is scarcely necessary to remark that what is here called seed is, in strict botanical parlance, the fruit of the plant.

Seed was collected in the late autumn of 1913, and was sown in a plot in the open. In the spring of 1914 twenty of the resulting young plants were selected for the purpose of detailed observations on their further growth and behaviour. During the summer of that year these plants developed the well-known "rosette" stage, and they remained in this condition over the winter of 1914-1915. Towards the end of May, 1915, they proceeded to develop their flowering stems, which in due course bore flowers and then seed. Most of the seed had ripened and become dispersed by the end of September, 1915. In October the plants began to die off, decay proceeding from above downwards, and by the end of December the plants, with one exception, were totally dead.

The exceptional plant was one which, when in flower in July, 1915, produced a short lateral shoot or bud in the axil of one of its leaves, close to the ground level. This shoot developed a few leaves and roots of its own and did not die away in December when the parent plant decayed. It lived until the end of the following February and then died, apparently as the result of a severe spell of frost. All of these twenty plants, therefore, behaved as biennials, and not as perennials.

Throughout the period during which this experiment was being carried on, recourse was had to very ex-

**Field Work.** tensive observations on ragwort plants growing in their natural habitats. Thus, during the autumn and winter of 1913, thousands of old plants which had seeded were carefully examined and watched, and it was found that they died out completely before the spring. Examination of their underground portions showed the total absence of any hibernating buds or other structures which are invariably associated with plants that are true perennials and which serve to carry on the growth from season to season.

During 1914 and 1915 these observations were continued, the work being extended over practically one-half of the counties in Ireland. As a general result, the previous observations were confirmed, but a small number of plants was also observed which behaved somewhat similarly to the exceptional one of the twenty already alluded to.

In these cases (some of them were plants from which the tops had been cut off, but others were normal, uninjured plants) buds were observed in the autumn in the axil of one of the lower leaves which did not die away at once on the decay of the parent plant, and which, provided they survived the winter unharmed, appeared capable of carrying the plant on into a third season of growth.

In order to follow this matter more closely, eight fields in different parts of the country were selected in each of which there was a good

crop of uncut ragwort. Three hundred plants in each field were closely examined, and out of a total of 2,400 individuals 77 (or rather over 3 per cent.) were found on which buds of this kind were present. Fifty of these 77 plants were then carefully marked with stakes and kept under further close observation. Thirty-five of them died away entirely during the winter, buds and all, while the buds of the remaining 15 produced flowering and seed-bearing stems in the following summer, and then died away completely.

The production of less than one per cent. of plants capable of existing for a third season cannot be regarded as invalidating the general conclusion already arrived at, viz., that ragwort in our country is typically a biennial plant, and, indeed, for the purposes of eradication may be regarded as exclusively so. From the biological point of view the production of these few plants having their growth extended for a further period of a year is interesting and may indicate that ragwort is in a transition state between a perennial and a biennial.

Briefly, then, the normal life-history of ragwort is as follows: In the autumn (and following spring) the seeds blown from old plants germinate and produce seedlings. During the first summer these seedlings develop into sturdy but compact low-growing plants with a rosette of green leaves which manufacture considerable quantities of food which the plant stores up. After the succeeding winter the plant develops in the second summer its flowering stems, chiefly at the expense of this stored food. Flowers are developed, seed is produced and disseminated, and then the plant dies out completely. Between the times of parent-seeding and death, and progeny-seeding and death a period of two years elapses and the plant is, therefore, a true biennial.

## II.—METHODS OF ERADICATING RAGWORT.

Since the only method by which ragwort is propagated is by means of seed, it follows that if the formation and distribution of seed can be prevented the eradication of this noxious weed is not a difficult matter.

Perhaps one of the most widely-known methods of exterminating ragwort is to graze land which is infested with it with sheep during the winter and early spring months. These animals are very fond of this weed and eat the hearts out of the plants, so that they do not produce flowers and seeds. During the progress of the present investigations convincing evidence was obtained showing the very good effect which grazing with sheep had in helping to

banish ragwort from infested fields. It is doubtful whether the importance of this method of controlling the weed is sufficiently thoroughly appreciated in this country, particularly by farmers in the northern counties. The method is both simple and effective and should be more widely adopted than it is.

A considerable amount of interesting information was obtained in regard to the effects of cutting ragwort at various times, and the results which follow are based on seventeen experiments carried out during two seasons in five Irish counties. The cuttings were carried out at intervals between the end of June and the middle of August, and the results were very similar in both seasons.

When flowering plants of ragwort are cut down at any time up to about the beginning of the third week in July they produce from the bases of the cut stalks a second growth. This second growth produces later in the same season flowers and seeds, and such seeds are in no way inferior as regards capacity for growth than the seeds produced from plants which have not been interfered with by cutting. Samples of the seed produced by such second growth tested at the Department's Seed Testing Station showed percentages of germination varying from 47 to 90, the average of five lots being 71 per cent. The cut flowering stems when severed at this early date gradually die and do not produce seed. It is clear, therefore, that a single early cutting of the weed is not of any real service in exterminating it.

When ragwort in its flowering condition is cut at periods dating from towards the end of July to the end of August, the cut portions lying on the ground possess sufficient vitality to enable considerable quantities of ripe seed to be produced in the course of the subsequent two or three weeks, which is distributed by the wind. Samples of such seed were collected and were found to germinate vigorously. The later the date of cutting the more certain will be the production of the seed and the greater will be its amount. If, therefore, a single late cutting is to be employed in trying to exterminate this weed, care must be taken to gather up and destroy by burning, without delay, the cut portions of the stalks.

On the other hand, when ragwort is cut late, the stumps of the old plants do not give rise to new growth which produces seed the same season, but any new growth which may develop remains seedless, and dies down completely with the plant during the winter. Cutting the plant at the flowering period, either early or late, does not cause its life to be extended a further season.

The effect of two cuttings in the season on the growth of ragwort was observed closely in three fields in Counties Down and Londonderry. A first early cutting was made during the second week in July, while the second was made when the second growth which developed was in full flower, about six weeks later. No seeds were produced by the cut portions of the plants after either of the cuttings, and after the second cutting the plants died out completely. This method of eradication, therefore, although perhaps rather laborious, may be regarded as an eminently satisfactory one provided that the cuttings be carried out at the correct time.

Eradication by pulling is practicable only when the area to be treated is comparatively small or in cases where the necessary labour is cheap and easy to obtain. It can only be carried out with success during or after a period of wet weather when the ground is soft. Pulling may take place comparatively early, say during the first half of July, when no further action need be taken. Where it is postponed to the end of that month, or even later, however, care must be taken that the pulled plants are collected and burned at once, otherwise they will produce seed, and so entirely nullify the labour of pulling.

### III.—SUMMARY.

The most important points resulting from this investigation may be summed up as follows:—

(1) Ragwort is a noxious weed which is biennial (i.e., lives for two years) in its habitat and which propagates itself by means of seeds alone.

(2) Ragwort may be exterminated by preventing the plant from seeding. This may be done in the following ways:—

(a) *By grazing* infested land with sheep in the winter and early spring;

(b) *By cutting* the plants in the flowering stage either—

(i.) *Twice*, the first cut being made early in July, and the second about six weeks later, there being no necessity to gather up the cut portions; or,

(ii.) *Once only*, cutting being done late in July or early in August. The cut portions of the plants must be gathered up at once and be destroyed by burning.

- (c) *By pulling* the plants if circumstances permit, preferably early in July, when there is no need to collect and burn the pulled plants. If pulled later, the plants must be collected and burned to prevent seeding.

It is most important to remember that since ragwort is a biennial plant it is absolutely necessary on pasture land to carry out cutting or pulling during two successive seasons.

It is clear that in addition to the two-year-old flowering individuals present in a given summer there must also be a crop of one-year-old plants still in the rosette stage which will produce their flowering stalks during the second summer.

Further, since it is practically certain that the seeds of ragwort, like those of charlock, poppy, and some other plants, may lie buried in the soil (although still retaining their vitality) for some time, it must be remembered that any farming operations which may bring these seeds to the surface will result in their germination and a crop of ragwort derived from such seed is not an infrequent occurrence on land newly laid down in grass.

Finally, owing to the ease with which the seed of ragwort is distributed by the wind the re-seeding of land temporarily cleared of it is an easy matter when the plant is allowed to flourish and produce its seeds on neighbouring land. There is, therefore, the strongest reason for scheduling this plant as a noxious weed all over the country and for throwing the responsibility for its eradication on the shoulders of all those who possess or occupy land.

P. M'GOVERN.

## LIVE STOCK FEEDING EXPERIMENTS.

Since 1912 live stock experiments have been carried out under the supervision of the Agricultural Instructors in almost every county in Ireland. This report deals with four series of experiments made during two years, 1913-14 and 1914-15.

In arranging the different experiments an effort was made to ensure that—

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|---|---|
| <p><b>Nature and<br/>Object of the<br/>Experiments.</b></p> | <p>(1) The subjects of investigation should be of general interest to stockowners.</p> <p>(2) The plan of the tests should be as simple as possible so that they might be carried out under ordinary farm conditions.</p> |
|---|---|

(3) A sufficiently large number of animals should be included in order to obviate risk of material error, and so enable reliable deductions to be drawn from the results.

In every experiment the animals selected were divided into two lots as even as possible as regards breed, age, weight, and general condition. For example, in the pig feeding tests the animals for both lots were, in most cases, selected from the same litter. The Instructors also endeavoured to arrange that the same number of animals of each sex was included in each of the two lots in the experiment. If during the period of the experiment an animal died or had to be removed for any reason, one corresponding in weight was removed from the other lot. Only the food consumed by those animals which completed the test has been included in the final calculations.

Many interesting details which have no general bearing on the results have been excluded from this report. For instance, no reference is made to the value of the animals at the beginning or end of the experiments, nor is an estimate made of the financial returns, as this depends so much upon market fluctuations and upon the personal skill exercised in buying and selling. For the same reason incidental expenses, such as cost of fuel, attendance and other items have been omitted, as they do not affect the comparisons between the different lots.

When these experiments were commenced in 1913 standard values for the different foods were assumed on the basis of their average cost for a number of years prior to that date. Although current prices are much higher, the standard values have been adhered to in this report, as it is hoped thereby to facilitate comparisons with experiments already completed and others which are now in progress. It may be of interest to mention, however, that some Instructors have used current prices in making up their reports for publication

in the Annual Report of their respective County Committees, and farmers who are desirous of obtaining information regarding the experiments which have been carried out locally should communicate with the Instructor for their county.

## I.—PIG FEEDING EXPERIMENTS.

### COOKED MEALS COMPARED WITH RAW MEALS.

During the two years 1911-12 experiments were carried out at the Agricultural Station, Clonakilty, to compare cooked meals with raw meals for fattening pigs.\* The results from 34 pigs (17 in each lot) showed an average gain of 6 lb. per head live weight in favour of the lot to which raw meal was given. As this result is contrary to the opinion held by so many persons who are engaged in the production of pork, it was deemed desirable to have further tests carried out on an extensive scale by Instructors in all parts of the country.

At the outset it is necessary to observe that only the meal portion of the ration was cooked. All the meals fed to one lot of pigs were either boiled or steeped in boiling water, while all the meals fed to the other lot were damped or steeped in cold water. In all other respects both lots were treated exactly alike. In some cases milk was supplied in equal quantities to both lots, and in 40 out of 60 tests potatoes, mangels or swedes were boiled and fed alike to each lot.

Tests were made at 60 centres in 23 counties with 464 pigs (232 in each lot); the average duration of the experiment was 102 days, and the average age of the pigs at the commencement was 13 weeks. Both lots received the same quantity of food.

The kinds, quantities and cost of the foods consumed by each lot of pigs are set forth below:—

Food	Quantity			Price	Total Cost
	T.	C.	Q. LB.	s. d.	£ s. d.
Maize meal ..	26	18	2 25	7 6 per cwt.	202 0 5
Pollard ..	16	14	3 5	7 0 „	117 3 7
Barley meal ..	0	6	1 22	7 0 „	2 5 2
Oatmeal ..	0	2	1 16	12 0 „	1 8 9
Oats ..	0	2	2 5	6 8 „	0 17 0
Linseed cake meal ..	0	0	1 14	10 6 „	0 3 11
Potatoes ..	51	10	0 25	40 0 per ton	103 0 5
Swedes ..	2	11	0 0	8 0 „	1 0 5
Mangels ..	1	7	1 14	10 0 „	0 13 8
Separated milk ..	10,974	gallons		1d. per gall.	45 14 6
TOTAL.					£474 7 10

\* See Department's JOURNAL, Vol. XIII., No. 2.



Particulars regarding the live weight increase of both lots of pigs are given in the following table:—

*Live weight increase.*

—	No. of Pigs.	Average weight at beginning.	Average weight at close.	Average increase in 102 days.	Average daily gain.
Lot fed on Cooked meals	232	cwt. lb. 0 74	cwt. lb. 2 3	cwt. lb. 1 41	lb. 1.50
Lot fed on Raw meals	232	0 74	2 10	1 48	1.57

The above figures show that at the close of the experiment the pigs that were fed on raw meals were, on the average, 7 lb. per head (live weight) heavier than those to which cooked meals had been given. At 41 out of 60 centres the results were in favour of raw meals.

At most of the centres the actual live weights of the pigs at the close of the experiment were determined. In seven cases, however, the dead weights only were ascertained, and the live weights were estimated on the basis of a loss of 25 per cent. for offal.

It may be stated, however, that both the live and dead weights were obtained for 96 pigs. It was found that for 48 pigs fed on cooked meals the carcase weight was 78.29 per cent. of the live weight, and for 48 pigs fed on raw meals it was 78.33 per cent.

*Cost of production (food only) at normal prices.*

—	Total cost of foods.	Total live weight increase.	Cost of producing 1 cwt. live weight increase.
Lot fed on Cooked meals	£ s. d. 474 7 10	cwt. lb. 316 104	£ s. d. 1 9 11
Lot fed on Raw meals	474 7 10	331 48	1 8 7

When the pigs were sold, efforts were made to obtain reports from the buyers on the quality of the pork. Such reports were received on the pigs from 43 out of 60 centres—three were in favour of the cooked meal lot, eleven were in favour of the raw meal lot, while in twenty-nine cases no difference could be distinguished in the quality of the pork from the two lots.

The results entirely confirm those obtained in the experiment carried out at the Agricultural Station, Clonakilty, to which reference has already been made. Having regard to the large number of

pigs included in these tests, to the varying conditions under which the trials were made and to the general uniformity of the results, it may be regarded as conclusively proved that :—

- (1) Pigs can be fattened as satisfactorily on raw meals as on cooked meals.
- (2) The period of fattening is not lengthened.
- (3) No extra food is required to produce the same results.
- (4) The quality of the pork is as good in one case as the other.

It appears, therefore, that the cooking of meals for fattening pigs is a needless expense entailing a waste of fuel and labour. If this fact were generally realised there is no doubt that pigs would be fattened on a more extensive scale, particularly by those farmers who experience difficulty in securing either men or women willing to take charge of pigs when all the food has to be boiled.

It has often been pointed out that where potatoes or roots have to be cooked, the water used for boiling them can be utilised for scalding the meals and that no saving in fuel is effected in such cases by feeding the meals in the raw state. Very large numbers of pigs, however, are fattened in summer when potatoes are not available, and even then it is customary to cook the meals. At 20 of the 60 centres to which this experiment relates, neither potatoes nor roots were fed, and at 14 of these centres the results were in favour of the raw meal.

Now that it has been shown that it is not necessary to cook meals for pigs, the question naturally arises as to whether any advantage is gained by cooking potatoes or roots. This point is receiving attention and preliminary experiments to test the matter are now in progress.

## II.—CALF FEEDING EXPERIMENTS.

### MAIZE MEAL COMPARED WITH STANDARD CALF MEAL.

Experiments carried out by the Department during the years 1902-4\* proved that satisfactory results were obtained from the use of a calf meal composed of :—

- 1 part ground flaxseed.
- 2 parts oatmeal.
- 2 parts maize meal.

Later tests† indicated that equally as good a mixture could be made by substituting ground wheat for the oatmeal. For a number of years the mixture of flaxseed, oatmeal and maize meal in the

\* See Department's JOURNAL, Vol. IV., No. 3; Vol. V., No. 3.

† See Department's JOURNAL, Vol. XIV., No. 3.

proportions set forth above has been regarded as a standard calf meal and generally recommended as such by the Department for use along with separated milk.

In order, however, to ascertain whether calves could be reared more economically by feeding maize meal alone with separated milk, an experiment was arranged in which maize meal was tested against the standard calf meal.

Tests were made at 31 centres in 13 counties with 242 calves (121 in each lot); the average duration of the experiment was 121 days, and the average age of the calves at the commencement was 6 weeks.

Each lot of calves received exactly the same amount of food. The only difference in the treatment of the two lots was that one lot was given the standard calf meal, and the other lot an equal weight of maize meal. In each case the meals were first boiled, or steeped in boiling water, and allowed to stand for about 12 hours, and then fed along with separated milk. At a few of the centres linseed cake or crushed oats or a mixture of these foods was also supplied in equal quantities to both lots; in all cases these foods were fed dry in a trough.

The following statements show the quantity and the cost (at normal prices) of the foods consumed by each lot of calves during the experiments:—

LOT I.—*Calf meal mixture.*

Food	Quantity			Price	Total cost		
	C.	Q.	LB.		£	s.	d.
Calf meal ..	..	138	3 7	14 0 per cwt.	97	3	4
Linseed cake ..	..	12	0 6	10 6 „	6	6	7
Crushed oats ..	..	7	2 15	6 8 „	2	10	11
Whole milk ..	..	625	galls.	5d. per gall.	13	0	5
Separated milk ..	..	20,602	galls.	1d. per gall.	85	16	10
TOTAL,					£204	18	1

LOT II.—*Maize meal.*

Maize meal ..	..	138	3 7	7 6 per cwt.	52	1	1
Linseed cake ..	..	12	0 6	10 6 „	6	6	7
Crushed oats ..	..	7	2 15	6 8 „	2	10	11
Whole milk ..	..	625	galls.	5d. per gall.	13	0	5
Separated milk ..	..	20,602	galls.	1d. per gall.	85	16	10
TOTAL,					£159	15	10

Particulars regarding the live weight increase of both lots of calves are given in the following table :—

*Live weight increase.*

—	No. of Calves.	Average weight at beginning.		Average weight at close.		Average increase in 121 days.		Average daily gain.
		cwt.	lb.	cwt.	lb.	cwt.	lb.	
Lot fed on Calf meal .	121	1	24	2	95	1	71	1.51
Lot fed on Maize meal .	121	1	22	2	90	1	68	1.49

From the above figures it will be seen that the average difference in favour of the calves fed on calf meal is only 3 lb. per head for the period of 121 days.

Examination of the returns from individual centres reveals the fact that at 22 out of 31 centres the live weight increase was in favour of the calf meal lot. Concerning the general appearance of the animals the Instructors' reports show that at 10 centres the calves in the calf meal lot possessed more "bloom" and were superior to those in the maize meal lot, at 6 centres the reverse was the case, while at 15 centres no difference in the two lots was apparent.

The superiority of the calf meal as regards both live weight increase and the general appearance of the calves is, therefore, almost negligible.

*Cost of production (meals and milk only) at normal prices.*

—	Total cost of meals and milk.			Total live weight increase.		Cost of producing 1 cwt. live weight increase.		
	£	s.	d.	cwt.	lb.	£	s.	d.
Lot fed on Calf meal . . .	204	18	1	197	79	1	0	9
Lot fed on Maize meal . . .	159	15	10	194	52	0	16	5

In the above estimates, no account is taken of the hay consumed in the house, or of the grazing after the calves were put on pasture. Since each lot of calves, however, was treated exactly alike in these respects the comparison between the two systems of feeding is in no way affected.

The chief deduction to be drawn from this experiment is that when separated milk is given, calves can be reared as successfully and at considerably less cost on maize meal as upon the standard

calf meal. This would seem to indicate that the use of a meal containing a relatively high proportion of oil is not necessary when calves have attained the age of from 5 to 6 weeks. In this connection it may be of interest to state the percentage composition as regards the chief constituents of the two foods :—

Calf meal :—Oil,  $10\frac{1}{2}$  per cent. ; Albuminoids,  $14\frac{1}{2}$  per cent. ; Carbohydrates, 58 per cent.

Maize meal :—Oil, 5 per cent. ; Albuminoids,  $10\frac{1}{2}$  per cent. ; Carbohydrates, 70 per cent.

It does not follow, however, that either of these foods is the best for rearing calves. Other foods may be found to be still more suitable. Indeed, preliminary experiments which have already been carried out tend to show that better results may be obtained by feeding separated milk, supplemented with some other food, such as maize meal or crushed oats, or a mixture of these in the dry state in a trough.

### III.—CATTLE FEEDING EXPERIMENTS.

#### EXPERIMENT A.—WITH CATTLE ON GRASS.

The object of this experiment was to ascertain whether it is profitable to feed cake and meal to cattle which are being fattened on pastures of second-rate quality.

At every centre the cattle selected for the test were divided into two lots, as even as possible ; to one lot was fed a mixture of cake and meal in the proportion of 2 parts undecorticated cotton cake and 1 part maize meal, while the other lot received no hand feeding. The daily allowance of cake and meal commenced with 3lb., which was later increased to 4lb., and before the close of the experiment to 5lb. per head.

The cattle were grazed in separate fields, but they were changed from one to the other at regular intervals of one or two weeks varying with the centre ; by this means neither lot was favoured by any difference that might have existed in the qualities of the pastures. At one centre both lots were grazed in the same field, and those to which the hand feeding was given were fed outside the field each day.

Tests were made at 14 centres in 9 counties with 158 cattle (79 in each lot), and the average duration of the experiment was 92 days.

The most important data relating to the experiment are summarised in the following tables :—

*Quantity and cost (at normal prices) of Concentrated Foods consumed by Lot I.*

Food.	Total quantity consumed.	Price per cwt.	Total cost.	Manurial value.*	Total cost less manurial value.
	c. q. lb.	s. d.	£ s. d.	£ s. d.	£ s. d.
Uncorticated cotton cake . . .	181 3 13	6 6	59 2 2	15 5 4	43 16 10
Maize meal . . .	90 3 20	7 6	34 2 0	2 19 10	31 2 2
TOTALS	272 3 5	—	93 4 2	18 5 2	74 19 0

*Live weight increase of Lot I. and Lot II. compared.*

—	No. of cattle.	Average weight at beginning.	Average weight at close.	Average increase in 92 days.	Average daily gain.
		cwt. lb.	cwt. lb.	cwt. lb.	lb.
Lot I.—Cake & Meal .	79	7 77	9 72	1 107	2.38
Lot II.—No Cake & Meal	79	7 84	9 51	1 79	2.08

*Cost of production (food only) at normal prices of Lot I. and Lot II. compared.*

Food.	Cost of concentrated food (less manurial value)	Cost of grazing.	Total cost of foods.	Total live weight increase.	Cost of producing 1 cwt. live weight increase.
	£ s. d.	£ s. d.	£ s. d.	cwt. lb.	£ s. d.
Lot I.—Cake & Meal	74 19 0	103 16 7	178 15 7	154 53	1 3 2
Lot II.—No Cake & Meal	—	103 16 7	103 16 7	134 81	0 15 5

The cost of pasturage was calculated at 2s. per head per week. This value may not be applicable to all districts, but it must be borne in mind that the cattle were grazed on land not of first-rate quality. Further, as the same amount is charged to each lot of cattle the value put upon the grazing does not affect the conclusions to be drawn from the experiment.

The average quantity of the cake and meal consumed per head was 3 cwt. 1 qr. 23 lb., and the resulting average gain in live weight per head was exactly  $\frac{1}{4}$  cwt. On the basis of the prices charged in the foregoing tables this increased gain in live weight was produced at a cost of almost 76s. per cwt.

\* These figures are calculated from the data given in the table reproduced in the Department's Leaflet No. 2—The Use and Purchase of Feeding Stuff, showing the composition and manurial value (at normal prices) of the principal foods.

If the results be judged solely by the live weight increase, the feeding of the cake and meal resulted in a loss. There is another factor, however, which requires consideration. Two lots of cattle may be of approximately the same weight, but still one group will realise an appreciably higher price, because the animals are better finished and possess more "bloom." The use of cake will often thus improve the condition and appearance of grass-fed cattle and indirectly prove profitable because of the higher price per cwt. realised when the animals are sold.

In this experiment the cake-fed lot would require to have realised 1s. 6d. per cwt. live weight more than the other lot to have paid for the cake and meal consumed.

At 11 of the 14 centres the cattle were either sold or valued at the close of the experiment. The enhanced value put upon the cake-fed lot varied from 1s. to 3s. 6d. with an average of 2s. per cwt.

This was rather more than sufficient to defray the outlay on feeding stuffs, but the profits were not such as to justify the general adoption of the practice, particularly with the current high prices of feeding stuffs.

It is possible that in some cases more satisfactory financial returns would be obtained if the feeding of cake were commenced in Spring, if, by so doing, the cattle could be finished and sold at the higher prices which usually prevail before grass-fed cattle begin to come freely on the market.

Better results might be obtained, too, from the use of concentrated foods other than those used in this experiment. In this connection it may be of interest to mention that in a former series of experiments\* carried out by the Department exactly similar gains in live weight were obtained from two lots of cattle, one of which received the same mixture used in this experiment and the other a mixture composed of 1 part wheat meal,  $1\frac{1}{2}$  parts barley meal, and 2 parts ground oats.

#### EXPERIMENT B.—WITH STALL-FED CATTLE.

The fattening of cattle in stalls is carried on mainly in tillage districts, and roots, chiefly turnips, are fed in large quantities. So general is this practice that many agriculturists are of the opinion that a liberal allowance of roots is essential to successful stall feeding.

This experiment was designed to compare two rations, one including a large supply of roots, and the other a small supply of roots with an increased quantity of concentrated foods:—

Lot I.—6 stones roots, with a moderate allowance of concentrated foods.

Lot II.—3 stones roots, with an extra allowance of 3lb. of concentrated foods.

\* See Department's JOURNAL, Vol. XIV., No. 3.

The mixture of concentrated foods used in the experiment consisted of equal parts of decorticated cotton cake, maize meal, and crushed oats, thus, for Lot II. 3lb. of this mixture was used to replace 3 stones of roots.

At the commencement of the experiment the quantity of the mixture of cake and meal fed to Lot I. was 3lb. and to Lot II. 6lb. per head per day. As the experiment progressed the quantity of the mixture was increased to the same extent for both lots. Throughout the whole period of the test Lot II. received, therefore, 3 stones less roots and 3lb. more cake and meal per head per day than Lot I. During the last stages of the fattening period a small quantity of linseed cake was fed to both lots alike at some of the centres.

Tests were made at 13 centres in 9 counties with 112 animals (56 in each lot) and the average duration of the experiment was 101 days.

The principal details of the test are shown in the following tables:—

*Quantity and cost (at normal prices) of concentrated foods and roots.*

Food.	Quantity consumed.	Price.	Total cost.	Manurial value.*	Total cost less manurial value.
	T. C. Q. LB.	s. d.	£ s. d.	£ s. d.	£ s. d.
Lot I.—					
Decorticated cotton cake .	4 5 0 6	9 6 per cwt	40 8 0	11 13 0	28 15 0
Maize meal .	4 5 0 6	7 6 „	31 17 11	2 18 9	28 19 2
Crushed oats .	4 5 0 6	6 8 „	28 7 0	3 3 9	25 3 3
Linseed cake .	0 6 1 4	10 6 „	3 6 0	0 11 8	2 14 4
Roots (turnips) .	212 10 1 0	8 0 per ton	85 0 1	28 6 8	56 13 5
TOTALS .	—	—	188 19 0	46 13 10	142 5 2
Lot II.—					
Decorticated cotton cake .	6 15 2 17	9 6 per cwt.	64 8 8	18 12 1	45 16 7
Maize meal .	6 15 2 17	7 6 „	50 17 5	4 13 10	46 3 7
Crushed oats .	6 15 2 17	6 8 „	45 4 4	5 1 9	40 2 7
Linseed cake .	0 6 1 4	10 6 „	3 6 0	0 11 8	2 14 4
Roots (turnips) .	106 5 0 14	8 0 per ton	42 10 1	14 3 4	28 6 9
TOTALS .	—	—	206 6 6	43 2 8	163 3 10

\* These figures are calculated from the data given in the table reproduced in the Department's Leaflet No. 2—The Use and Purchase of Feeding Stuff, showing the composition and manurial value (at normal prices) of the principal foods.



In addition to the concentrated foods and roots mentioned in the foregoing table, each lot of cattle consumed equal quantities of hay and straw as follows:—

		T. C.	Q. LB.	s. d.		£ s. d.
Hay ..	..	25 17	0 14	at 40 0	per ton	51 14 3
Straw ..	..	11 4	0 14	at 80 0	„ „	16 16 2
TOTAL,						£68 10 5

The value of the fodder is included in the table below showing the cost of production, but the manurial value has not been deducted as the hay and straw were fed to both lots alike.

*Live weight increase.*

Lot.	No. of cattle.	Average weight at beginning.	Average weight at close.	Average increase in 101 days.	Average daily gain.
		cwt. lb.	cwt. lb.	cwt. lb.	lb.
Lot I.—6 stones roots .	56	9 37	11 8	1 83	1.93
Lot II.—3 stones roots.	56	9 44	11 25	1 93	2.03

*Cost of production (food only) at normal prices, less manurial value of roots and concentrated foods.*

Lot.	Total cost of foods.	Total live weight increase.	Cost of producing 1 cwt. live weight increase.
	£ s. d.	cwt. lb.	£ s. d.
Lot I.—6 stones roots . . . . .	210 15 7	97 56	2 3 3
Lot II.—3 stones roots . . . . .	231 14 3	102 56	2 5 2

From the above figures it will be seen there is a difference of 5 cwt. in the total live weight increase, which is equivalent to 10lb. per head in favour of Lot II. which received the smaller ration of roots. The returns from individual centres show that 7 were in favour of the ration of 6 stones of roots, 5 were in favour of the ration of 3 stones of roots, and at one centre the results were identical.

It may be observed that the cost of producing 1 cwt. live weight increase was 1s. 11d. higher for Lot II. than for Lot I. This is owing to the fact that turnips (which were fed in larger quantities to Lot I.) were worth relatively more than the price charged, viz.: 8s. per ton.

The results indicate :—

- (a) That cattle can be fattened successfully when as small a quantity of turnips as 3 stones is given per head per day.
- (b) That when turnips are fed at the rate of 6 stones per head per day half the quantity can be replaced satisfactorily by concentrated foods, in the proportion of 1lb. of a mixture of equal parts of decorticated cotton cake, maize meal and crushed oats for 1 stone of roots.

At the normal prices of feeding stuffs quoted in the tables the mixture of cake and meal cost £7 17s. 9d. per ton, which, on the basis of 1lb. of the mixture being equal to 1 stone of roots, gives an equivalent value for the turnips of 11s. 3d. per ton. This does not take into account, however, the extra gain of 10 lb. per head made by the cattle in Lot II.

The question as to the extent to which turnips should be used when stall feeding is practised is one for each farmer to decide according to his local circumstances. It has already been shown that at normal prices for concentrated foods turnips are worth 11s. 3d. per ton. With the current prices of cake, meal and grain, roots are worth at least 17s. per ton.

On average tillage land in Ireland where the root break is well managed it should be possible to produce roots at considerably less cost than 11s. per ton.

In most cases, therefore, it would appear to be sound economy to grow roots extensively and feed them liberally along with a moderate quantity of concentrated food. On the other hand, where, from one cause or another, the supply of roots is limited, farmers need not be deterred from fattening a few head of cattle, especially when the prices of cake and meal are low.

### GENERAL SUMMARY.

The principal results of the experiments may be summed up as follows :—

#### I.—*Pig feeding experiments.*

The cooking of meals for fattening pigs is not necessary, and possesses no advantage as regards :—

- (a) The amount of food consumed,
- (b) The length of the fattening period; or,
- (c) The quality of the pork produced.

On the other hand, the use of raw meals saves labour and fuel.

## II.—*Calf feeding experiments.*

Fed to calves in conjunction with separated milk, maize meal gave practically as good results as a calf meal composed of 1 part ground flaxseed, 2 parts maize meal, and 2 parts oatmeal.

## III.—*Cattle feeding experiments.*

### A.—With cattle on grass.

- (a) A direct profit from an increase in live weight cannot be anticipated from feeding a mixture of concentrated foods composed of 2 parts undecorticated cotton cake and 1 part maize meal to cattle on second-rate pasture.
- (b) Indirectly the practice may prove profitable if, as a result of the hand feeding, the cattle can be sold at a higher price per cwt. This enhanced value may arise from earlier marketing in summer or from the better condition and appearance of the animals.

### B.—With stall-fed cattle.

- (a) Cattle can be fattened successfully when as small a quantity of turnips as 3 stones is given per head per day.
- (b) Almost similar results were obtained from the following rations :—
  - (1) 6 stones roots with a moderate allowance of concentrated foods.
  - (2) 3 stones roots with an "extra" allowance of 3lb. concentrated foods.

In other words, half the quantity of roots was satisfactorily replaced by concentrated foods, in the proportion of 1lb. of a mixture of cake and meal for 1 stone of roots.

## CLASSIFICATION OF EGGS FOR MARKET.

[The classification and description of eggs for marketing purposes is a matter of no small difficulty, and much attention has been devoted to considering how the problem may best be solved with due regard to the interests of all the parties concerned. The apparently simple question: "What is a fresh egg?" evokes answers which reveal a surprising divergence of opinion as to the qualities which may legitimately be expected in an egg of that description. The egg trade nowadays has attained to a position of greater importance than ever before, and the precise definition and description of the various classes of eggs that come upon the market has become a matter of great practical urgency. In France, for instance, where the egg trade is a large and important one, much attention has been devoted to reaching a tolerable degree of precision in the matter of classification. The careful and systematic study which has been bestowed upon this question is revealed in the following pages, which contain a translation of extracts from an article\* written by M. Chrétien, one of the Veterinary Health Officers of the Department of the Seine. The duties of these officials include the inspection of the famous *Halles Centrales* or central produce markets of Paris.]

Eggs, like meat, and for the same reason, may be regarded as a food stuff of prime importance. They contain, within a small compass, all the indispensable elements of nutrition; they are rich in fatty substances and nitrogenous matter; they contain phosphate of lime, chloride of sodium and iron in a sufficient quantity, and so are a nearly complete food.

The yolk in particular possesses nutritive qualities which are specially valuable, for it contains lecithins—organic substances with a base of assimilable phosphoric acid.

This is why eggs are recommended for children, invalids and convalescents; it is also why they play such a prominent part in our dietary.

Almost all the eggs consumed in this way are hen eggs. If we examine an egg we may note the following con-

**Composition**      constituent parts:—

**of Eggs.**

(1) *The shell*, white or buff-white in colour, the function of which is exclusively protective.

The variable colour of the shell is said by some authorities to be due to a special secretion of the uterine region of the oviduct and by others it is explained as being caused by the bile mixing with the excrements.

\* In the journal entitled *Hygiène de la Viande et du Lait*, vol. iv., p. 465.

From the chemical point of view, the shell is formed of 90 per cent. of carbonate of lime, 5 per cent. of phosphates, especially phosphates of lime and magnesia, and 5 per cent. of organic substances.

It is pierced by numerous tiny pores, visible under the microscope, which facilitate the interchange of gases between the inside of the egg and the outer air.

(2) The *shell membrane* adhering to the inside surface of the shell. This membrane is whitish, and is formed of hardened albumin. Immediately after the egg is laid, the membrane divides, at the larger end of the egg, into two layers which separate. Between these two layers the air space is formed.

(3) The *white* or albumin. This contains about eight-tenths of its weight of water, and slightly more than one-tenth of albumin. The rest consists largely of phosphate of lime and chloride of sodium.

(4) The *chalaziferous membrane*. This is colourless, and consists of a layer of denser albumin which terminates in two spiral cords known as chalazae. The chalazae float suspended in the white of the egg and lie in the direction of its longer axis.

(5) The *yolk*, a large sphere representing the food reserve of the ovum. Its colour varies from a very pale yellow to a yellow which is almost red. It is contained inside a transparent membrane called the vitelline membrane, and has on its outer surface a small white spot, the cicatricula. It contains a special kind of albumin known as vitellin, together with various other nitrogenous substances, fatty matter, a red colouring matter, lecithins (phospho-glyceric acid), mineral salts and traces of iron.

\* \* \* \* \*

The weight of hen eggs is very variable, and seems to depend both upon the breed and the country of production.

For eggs of different places of origin, marketed in Paris, the following weights,\* approximately, have been noted:—

Orne	..	..	..	from $1\frac{1}{2}$ to $2\frac{1}{2}$ oz.
Calvados	..	..	..	„ $1\frac{1}{2}$ „ $2\frac{1}{2}$ „
Ille-et-Vilaine	..	..	..	„ $1\frac{1}{2}$ „ 2 „
Finisterre	..	..	..	„ $1\frac{1}{2}$ „ $1\frac{7}{8}$ „
Egypt	..	..	..	„ $1\frac{1}{2}$ „ $1\frac{1}{2}$ „

There are, besides, eggs of inferior weight to those indicated above, but they are sold separately.

Owing to its complex nature, the egg, like meat, is eminently perishable. If its nutritive constituents are protected against external influences it is only in an imperfect manner. The shell, for instance, is riddled with pores, through which part of the water in the albumin and the yolk evaporates, but through which also the atmospheric air and micro-organisms gain access.

\* Throughout the article, metric weights and measures have, for convenience' sake, been converted into their approximate English equivalents.

It is, therefore, highly necessary that eggs supplied for consumption should not have suffered any change, and that their characteristics should as nearly as possible approach those of freshly laid eggs.

Eggs sold for table purposes may be divided into four categories:

**Trade Classification of Eggs.** (1) First Quality Eggs, *œufs à la coque*;\* (2) Second Quality Eggs; (3) Third Quality Eggs; and (4) Preserved Eggs.

**First Quality Eggs.**—Speaking generally, the maximum age of these eggs is a fortnight in summer and three weeks to a month in winter. The shell, white or buff-white in hue, has a uniform coloration; it is coated with a substance of a slightly fatty nature which imparts to the shell a peculiar "bloom" and is due to a secretion of the glands in the lower part of the oviduct.

When the egg is broken, the yolk has a nice round appearance, being contained and supported by the vitelline membrane, which is smooth and transparent. Uniform in colour, ranging from pale yellow to reddish yellow, the yolk is slightly fluid, and is homogenous throughout its whole mass.

The white extends around the yolk; it is completely transparent, and forms a single semi-fluid mass; it is faintly shaded, slightly viscous, ropy, and has a cohesion such that it is difficult to separate it into a number of portions. It possesses the property of forming an emulsion with the air when beaten or whipped to a froth.

The chalazae, which are more refractive than the white, appear in the latter in the form of thick spirals, uniformly transparent.

Inside the shell, the shell membrane appears smooth and adhering everywhere except at the larger end of the egg where the air space is to be found. There is no air space when the egg is first laid, but a continuous evaporation of moisture from the different parts of the egg is soon set up, whilst air penetrates between the two layers of the shell membrane, but only at the larger end of the egg.

The size of the air space is thus an important factor in estimating the age of an egg; as its formation depends upon evaporation, it is easy to see that it will make its appearance sooner, and will increase more rapidly in summer than in winter.

In a fresh egg, one which has been laid only a few days, the air space will be very small, and its diameter will not exceed four-fifths

\* The term *œufs à la coque*, as used in the French egg trade, is applied to eggs of the first commercial quality, probably corresponding to what are known amongst high-class traders in this country as "breakfast" or "new-laid" eggs.

of an inch. There is no abnormal smell from an egg of this kind; on the contrary, it exhales a peculiarly fresh odour of its own.

One of the commonest means of judging the freshness of an egg is the process known as "candling" which is carried out in a dark room, and consists in interposing the egg between the eye of the observer and a light.

A new laid egg, examined in this way, presents the following characteristics:—The shell is uniformly transparent; the white, as one may imagine, is perfectly translucent, and shows no opaque spot or cloudy appearance; it entirely fills the interior of the shell, except at the larger end of the egg, where we find the air space. The latter is very small in volume; it is recognised chiefly by the shell membrane, the inside layer of which is now not more than  $\frac{3}{4}$  of an inch in diameter, is well stretched and is not displaced when the egg is shaken.

In the centre of the egg the yolk appears like a dark mass, round in form and nowhere adhering to the shell. If the egg be rotated quickly the yolk swings slightly in the white, but suffers no deformation, and quickly resumes its central position.

Such an egg, if shaken gently in the direction of its longer axis, does not rattle. If rolled fairly quickly along a flat surface, it moves regularly and not in a jerky fashion.

Eggs with these characteristics are known in the trade as "small-crowned eggs" (*œufs à la petite couronne*) owing to the small volume of their air space. They are sold as first quality eggs (*œufs à la coque*).

When plunged into a quantity of boiling water equal to at least twelve times their volume, they crack and allow part of their contents to escape. This little accident, in itself a sign of freshness, is due to the still almost complete fullness of the egg, and to the sudden dilatation of its internal parts.

The number of days mentioned above, during which the egg retains these characteristics, is only approximate. It is variable, and depends not only on the temperature, but also on the thickness of the shell. Eggs from the regions of Beauce, Brittany, Burgundy, and the neighbourhood of Dieppe, which have a thick shell, deteriorate much less rapidly than do the thin-shelled Normandy eggs. The same is true of Egyptian eggs, which have a very hard shell.

Under the category of Second Quality Eggs we have to consider eggs which possess very marked nutritive quali-

**Second Quality Eggs.** ties, but whose freshness is not such that they may be served boiled in the shell, i.e., *à la coque*.

In first quality eggs the air space is very small, but it only remains so for a very short period; it increases pre-

gressively until it occupies one-fifth or even one-fourth of the total volume of the egg. Drechsler gives the following average figures :—

Age of Egg :—	1 day	6 weeks	15 weeks	4½ months
Diameter of air space :—	$\frac{3}{4}$ inch	1 inch	1½ inch	1¾ inch

In a general way it may be said that the age of second quality eggs does not exceed 12 weeks, and that the diameter of their air space varies from  $\frac{3}{4}$  of an inch to 1½ inches.

The latter is very plainly to be seen when the eggs are “candled”; it is always situated at the larger end of the egg, but lies obliquely. In fact, as the egg is generally kept lying in such a way that its greater diameter is horizontal, the air space spreads obliquely towards the upper parts. Its dimensions can be easily distinguished as also can the thin layer of shell membrane which separates it from the white. This layer is always rectilinear, but moves when the egg is shaken. Meanwhile other changes are also taking place.

The shell becomes slightly mottled; when tested at the lamp it shows at first small grey spots which spread, merge one into another, and form large patches which appear dark in comparison with other patches which have remained more transparent. The egg is then said to be *grey*. The white appears more fluid. The yolk seems less consistent and if the egg is rotated moves slowly from its place in the middle of the white, and for a moment almost comes in contact with the shell.

If the egg be broken the yolk is still globular but more flattened; its colour has frequently become a yellowish white. The vitelline membrane, which is still transparent, contains many folds. The white has not changed colour, but has become more watery. The chalazae are less plainly marked, are thinner and less twisted. If we shake an egg of this kind in the direction of its longer axis, we perceive a peculiar rattling noise, and we feel a slight impact in our finger tips. If the larger end be gently tapped a peculiar sound is produced which enables us to judge of the size of the air space. Finally, if rolled along a plane surface the egg moves irregularly and unevenly, thus showing that some of its portions are denser than others. Eggs of this kind have no bad smell, even after cooking, but they are less savoury and have not the agreeable flavour of new laid eggs.



After a certain lapse of time the grey or second quality egg undergoes certain changes, which cause it to lose

**Third Quality Eggs.** its market value, whilst at the same time its nutritive properties diminish. Examined in full

light it presents no special characteristics and resembles a recently laid egg. When candled, however, the air space is found to be in every case voluminous. The shell, in addition to its mottled aspect, has now one or two very dark points, scarcely larger than the head of a pin; the yolk adheres to the shell membrane at these points, and the adhesions may be broken if the egg is slightly shaken. The yolk then resumes its original central position, but the shell remains dark at the points of attachment, and the egg is said to be *spotted*. At this stage part of the yolk is sometimes seen to escape from the vitelline membrane and to mingle partially with the white. If the egg be broken the yolk spreads out flat instead of remaining globular.

It is easy to understand how these dark points form in the shell. The egg, which is fairly advanced in age, has remained for some time in a case or other receptacle without any change of position. The yolk being less dense than the white, moves constantly upwards, which movement is facilitated by the white becoming more and more watery. The yolk thus comes into contact with the shell, and the vitelline membrane unites with the shell membrane at the points of contact, thus forming the dark patch observed in the light test. It is probable that at this moment microbes from the air cause the outermost part of the yolk to deteriorate.

Under the effect of a sudden movement the vitelline membrane breaks at its point of attachment; the yolk floats once more in the midst of the white, but lets a part of its contents escape owing to the breaking of the continuity thus formed. Much more, when the egg itself is broken, does the major part of the yolk escape from the vitelline membrane and spread out over the surface of the white. Under these circumstances the egg does not give off a bad odour, but it has an insipid or what is described as an "old" taste, which is more noticeable in eggs served *sur le plat*\* than in an omelette.

The appearance of these phenomena may be retarded if the egg is turned through one-fourth of its circumference and about its longer axis every three or four days. The upward movement of the yolk towards the shell is thus counteracted, and adhesions will be slow in forming.

\* That is, baked with butter in the dish in which they are served. Sometimes called "mirror eggs" in English. Larousse defines them as *œufs cuits légèrement dans le beurre, sur un plat spécial*.

Such eggs are difficult to sell owing to their disagreeable flavour and peculiar appearance when broken. Their nutritive value too is very small. The phenomena of decay are about to make their appearance.

\* \* \* \* \*

Under the description Preserved Eggs are included eggs which have been subjected to special processes which enable them to retain for a long time their nutritive properties and prevent their decay.

The object of the various modes of procedure followed in preserving eggs is to prevent the evaporation of their constituent moisture, and the penetration of micro-organisms from the outer air. Moreover, it is necessary that clean eggs only shall be used, and if possible eggs which have not been fertilised and which as yet show no beginnings of decay.

Two methods practised on a wholesale scale are the following:—

<p><b>Methods of Preserving Eggs.</b></p>	<p>1. <i>Cold storage</i>.—The eggs are placed in cold chambers, the temperature of which varies from 34° to 28° F. The hygrometric condition of these chambers should be sufficient to prevent evaporation.</p>
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Eggs thus preserved outwardly resemble fresh eggs. Moreover, no special feature is observable when the egg is subjected to the light test or when it is broken. The air space has not increased in volume. A few eggs may appear grey or even spotted, but these are the exception, for special contrivances enable the eggs to be turned slowly and continually so that the yolk retains its central position. But the good flavour of the fresh egg has disappeared, and has been replaced by an insipid taste which is specially noticeable when the egg is boiled or served *sur le plat*.

2. *Lime solution*.—This very ancient method consists in placing eggs in a vessel filled with freshly prepared lime water, and in keeping them in a cool place. The bath hinders evaporation, and the alkaline matter which it holds in solution prevents all fermentation, whether in the egg itself or in any organic substances that may be contained in the water. The contrivances mentioned as used for turning cold storage eggs are also applicable in this case to prevent the yolk from coming into contact with the shell. "Lime-water eggs," as they are called, are very easily recognised. Their shell has lost the "bloom" which is characteristic of the normal egg. It is also remarkably white, for lime has been deposited on its surface; it is, moreover, slightly rough to the touch. Two lime-water eggs, when lightly knocked together, give forth a peculiar sound—clear and rather metallic.

When tested with the light, the interior is found to be perfectly

clear and the air space of normal volume, but the yolk swings readily out of the centre of the white which has become watery. This last mentioned quality of the white is even more clearly recognised when the egg is broken. The white, though limpid, has a slightly greenish tinge; it has become more liquid and less viscous and it lacks cohesion. It cannot be whipped to a froth. The shell, too, is remarkably thin. For this reason these eggs cannot be boiled. They have, moreover, always an insipid alkaline taste.

Many other methods have been recommended for preserving eggs, amongst others the following:—

1. Coat the shell with varnish or grease, or some plastic material which will hinder the evaporation of moisture and the entrance of air. For this purpose the following have been used:—silicates, vaseline, paraffin, an alcoholic solution of shellac, a mixture of 65 per cent. water, 20 per cent. spirits of wine, 7.5 per cent. salt, 5 per cent. resin and 2.5 per cent. pepper. These methods are not practical; they are expensive, and the preservation of the egg seems to be only moderately assured.

2. When eggs are to be kept only for a short space of time, it may suffice to place them in jars filled with bran, grain, sawdust, very dry sand, characoal dust, wood ashes or peat. This method is only practicable for small quantities of eggs, and it is effective if the jars are set in a dry, cool place at fairly constant temperature.

3. Siem Jensen (Danish Pat. No: 6359, 17th April, 1903) recommends the following method. The eggs are placed in a moist atmosphere, and exposed to red rays of light, which destroy the microbes on the surface of the egg as well as those inside. Eggs may be kept fresh in this way for as long as nine months.

4. Again, eggs may be placed in a jar filled with salt and water, but in this case they become so impregnated with salt as to be unfit for consumption.

Mariot-Didieux recommends the following method as being very efficacious. Wooden boxes are lined with paper. The bottom is then covered with a thin layer of white Vosges salt and on it are laid the fresh eggs, side by side. The interstices are filled with fine salt. The box is packed up in this way with successive layers of eggs and salt, and placed in a cool, dry place. Eggs stored in this way will keep for a very long time, and only suffer slightly from evaporation. The whites, however, are a little salty.

It has also been proposed to plunge eggs into water through which passes an electric current.

5. Sometimes the white and the yolk are separated and preserved in jars hermetically sealed; they may also be pulverised after being desiccated at a moderate temperature.

\* \* \* \* \*

The eggs sold in Paris are not produced exclusively in France.

Although in spring and summer the French provinces suffice to supply the capital with eggs, **The Paris Egg Trade.** this is not the case in autumn and more especially in winter. At that time we find preserved eggs on sale and also eggs which are described as foreign.

The preserved eggs of French origin are all "lime-water eggs." Certain manufacturers have succeeded in producing, by that process, eggs of irreproachable quality, absolutely spotless, and not showing the slightest deterioration in the yolk or even in the white. The appearance of the shell alone shows us that the egg was preserved in lime solution.

Under the term "foreign eggs" are described more particularly eggs coming from Russia, Germany and Italy. The Russian export is the largest, and comes through the Baltic ports.

In 1903 Russia exported to England, Germany, Denmark, Holland, Belgium and France 2,229 million dozens of eggs. In 1904 the export had risen to 2,768 million dozens.

France received in 1902 20,204,200 kilos of foreign eggs, and 19,364,800 kilos in 1903 of which 82 to 90 per cent. came from Russia. The latter eggs are of excellent quality, and are lower in price than the French eggs at the time when they come upon our markets. But everything tends to prove that they are cold storage eggs.

The eggs which come from Germany seem likewise to have been preserved by cold storage. As to the Italian eggs, which do not arrive in Paris until January and February, they are fresh eggs.

During the winter of 1906-1907 a great quantity of eggs from Rumania arrived at the Central Markets in Paris. Their quality was perfect, and contrasted singularly with their price, which was below the ordinary quotation. People were inclined to think it was a case of some special scientific method of preserving, but in our opinion these eggs presented all the characteristic qualities of fresh eggs, and should be considered as such. In Rumania, eggs, like meat, are sold at a very moderate price (mutton, for example, sells at 2d. per lb.\*), and the dearness of eggs in Paris during winter favours the export trade.

We have in France an analogous state of affairs, for Brittany and Normandy export great quantities of eggs to England. In 1903 the value of that export was 16 millions of francs.

Under the terms of a Decree, dated 21st July, 1815, officials (known as *compteurs-mireurs*) were appointed to

**Inspection of** count eggs and subject them to the light test.  
**Eggs in Paris.** The inspection of eggs in the Paris market is in the hands of these men, who are appointed

\* This was before 1910. Since then the price has risen; in 1913 it was 4d. per lb.

after competition and are under the control of the Prefect of Police, Their duty is to check each parcel, counting the number of eggs therein contained and removing those which are unfit for consumption, in accordance with the terms of the Convention of 24th February, 1888.

Article 1 of that Convention states that "The vendor must supply eggs which are sound and saleable." The object of checking the parcels is "to determine the number of rejections, i.e., the number of bad eggs which must be withdrawn, and also that of small eggs, frozen eggs, spotted eggs or lime-water eggs which, by reason of their inferior market value, would cause a reduction in the sale price."

Article 2 enacts that "rejections shall justify the following reductions :—

1. "The total number of eggs which are missing, decayed or lost by breakage (*cassés-perdus*).
2. "Two-thirds of the number of spotted eggs.
3. "One-half the number of small or frozen eggs.
4. "One-third only of the lime-water eggs.

"(Eggs are said to be *small* when they will pass through a ring  $1\frac{1}{2}$  inches in diameter.)"

The inspectors have control only of parcels offered wholesale at the central markets, and only if the buyer demands their verification. They work either at the markets or at the domicile of the purchaser should the latter desire it.

All the eggs are unpacked, counted and candled. The latter operation is carried out in a dark room, lighted for preference by a single candle, and takes about one hour for a parcel of 1,000 eggs. Eggs unfit for consumption are assigned to industrial purposes; some of them serve for making bird-cakes, but the bulk of them are used in leather dressing and in the albumin factories.

All eggs sold at the Central Markets are not inspected. Many dealers, on the contrary, receive their consignments direct. Those whose interest it is to sell sound eggs carry out the light test themselves, and sell the inferior eggs for industrial purposes. Others, however, for instance certain confectioners, are less scrupulous, and prefer to buy spotted eggs because of the lower price, and it is not unlikely that in a good number of instances this is one of the chief causes of poisoning following the eating of cream cakes.

## RURAL SCIENCE AND SCHOOL GARDENING.

By W. H. JOHNS, F.R.H.S., *Municipal Technical Institute,  
Belfast.*

Within recent years great interest has been taken both at home and abroad in the subject of School Gardening. In England and Wales, where school gardening has been practised for a number of years, there has been a considerable increase in the number of school gardens, and there are now some thousands of schools in which the subject is taught. In Scotland, too, there has been a rapid growth of the number of school gardens within the last decade.

In Ireland the subject is a comparatively new one, and though there were a few schools which had school gardens in connection with the older agricultural and horticultural schemes, the general commencement of this subject dates from 1910 when the Department's present scheme of Rural Science and School Gardening was introduced. At the present time there are 150 schools in which the subject is taught (by teachers who have been specially trained under the Department's Programme).

The subject has also been taken up in Australia, New Zealand, Ceylon, Canada, and other parts of the British Empire, as well as in other parts of the globe, more particularly the United States of America—where magnificent developments have taken place—and over the major portion of Europe.

The schemes of instruction, and the methods adopted in teaching school gardening vary greatly from one part of Great Britain to the other, and only in Ireland does there appear to be any standardised scheme, both for the training of teachers and for the instruction of the pupils. Many of the teachers of this subject in Great Britain have obtained the Royal Horticultural Society's Certificate in "School, Cottage and Allotment Gardening"; some have attended vacation or Saturday courses of one of the different centres; a few have obtained the Board of Education Certificates in "Rural Economy" and "Horticulture," while some teachers, who are expert amateur gardeners, have not troubled to obtain these certificates.

In some of the schools the subject is taught by an Instructor in Horticulture, and in others by a qualified gardener, or by a special peripatetic instructor.

Perhaps the main distinction between the various British and Irish schemes of School Gardening lies in the fact that in Great Britain the subject is regarded mainly as a practical or handicraft subject, whereas in Ireland the Department, while insisting upon the practical side, have sought to co-ordinate it

with the teaching of Elementary Practical Science with the view to making it truly educational. This is the idea underlying their Syllabus on "Rural Science including School Gardening."

Before considering further the methods adopted in Ireland it might be well if some of the reasons, set forth from time to time, for adopting the subject in the public elementary and other schools were stated. The objects are first and foremost educational, and aim at improving the general education of the child, rather than in adding another subject to the curriculum (already crowded) for the child to learn. It is rather as a means to an end than as a subject, that, it is introduced, although much might be said for it as a subject pure and simple. It is not the intention merely to train skilled gardeners or farmers—although it might be mentioned in passing that many of the boys who have been taught school gardening have turned out to be amongst the most successful of the gardeners, farmers and allotment-holders, both at home and abroad, but rather to train pupils full of resource and initiative, with confidence in themselves and having an alert mentality well stocked with common sense.

It is urged that pupils taking up this subject have always something to do themselves, both with their hands, eyes, and brains; some definite problem to tackle, to observe and to await the result of. As a consequence they become intensely interested, and their powers of observation, thinking, and reasoning, soon show signs of development.

In attacking the varied and never-ending problems, in order to learn something of Nature and her ways, science and scientific methods are learned and brought to bear, and as much of the work is done by the pupils rather than by the teacher, they develop habits of self-reliance, etc., which often prove of great value in after life.

The subject affords a link to most of the subjects already taught in the schools—taking these subjects out of their too often, water-tight compartments and uniting them into some semblance of a perfect whole. In describing the objects observed, the experiments carried out, and the results obtained, language, reading and composition play an important part. In making a representation of the specimens grown and under observation drawing becomes interesting—most pupils delight in drawing something living, whereas the drawing of a vase or of the usual flat copy rarely appeals to them. Geometrical drawing, plan and map-making can easily be commenced in the school garden,

starting with the measurements taken around the various plots, and leading up to a regional survey of the neighbourhood in which the school is situated. On the individual plans the route taken by each pupil on his way to the school should be shown, and at the same time something of the local landmarks, their geography and history should be studied, thus leading up to the geography and history of the country and of the world.

In valuing the produce grown, weighing the crops, etc., arithmetic and mathematics generally, become "live" subjects, and graphic representation appears to be more interesting, and less difficult to do. Where handicraft subjects, such as woodwork, are taught, some of the implements and articles used in the school garden can be made, these often providing much better exercises than many of those which are so often set. To the girls, also, the learning of household economy, including cookery, becomes more interesting. The flowers grown are used in various ways to make the home beautiful, while the various kinds of vegetables grown are often utilised to make appetising and economical dishes. The salad plants, such as Lettuce, Radish, and Cress, being obtained fresh, instead of in the limp condition in which they are too often sold, are often better appreciated and eaten with relish, instead of being regarded, as one school gardening pupil told me, as food for the cattle.

Where Bees are kept in the school garden—and they often are—the use of honey as a substitute or even as an improvement on sugar for sweetening cakes, etc., can be demonstrated. It is also suggested that for rural schools more particularly, the introduction of school gardening gives a much-needed rural bias to the subjects already taught.

The science taught under such schemes is the science of common objects and of phenomena of daily life, instead of the science of objects of which the pupils, not having seen them, have no idea. Thus the interest of the pupils is aroused, not only in the problems of the school garden, but also in the problems of the home garden and the farm; such as (1) the treatment of the soil at school and at home, (2) methods of cultivation, (3) methods of dealing with undesirable insect and soil pests, weeds, etc.

As a result of the interest aroused and the knowledge obtained there is a lesser tendency to look upon work connected with the soil as work to be despised; consequently there is not the same tendency in after life to drift aimlessly to the towns and cities. While on the other hand the town pupils, probably realise for the first time—in the school gardening course—the importance of light and air, for the support of life, and having learned the lesson, will, when the chance comes, seek the houses of the suburbs or the country, with their gardens, rather than the tenements of the densely populated areas.



It is also claimed for this subject, that it is one of the very few subjects in which the so-called dull and bad boys—boys who do not usually take an active interest in school work, or who are so full of energy that they cannot long remain quiet—do justice both to the subject and to the teacher, as well as to themselves; while a number of authorities claim that the adoption of this subject in schools raises the general standard of education and intelligence in a comparatively short time, resulting also in better attendances and an improved moral tone in the schools.

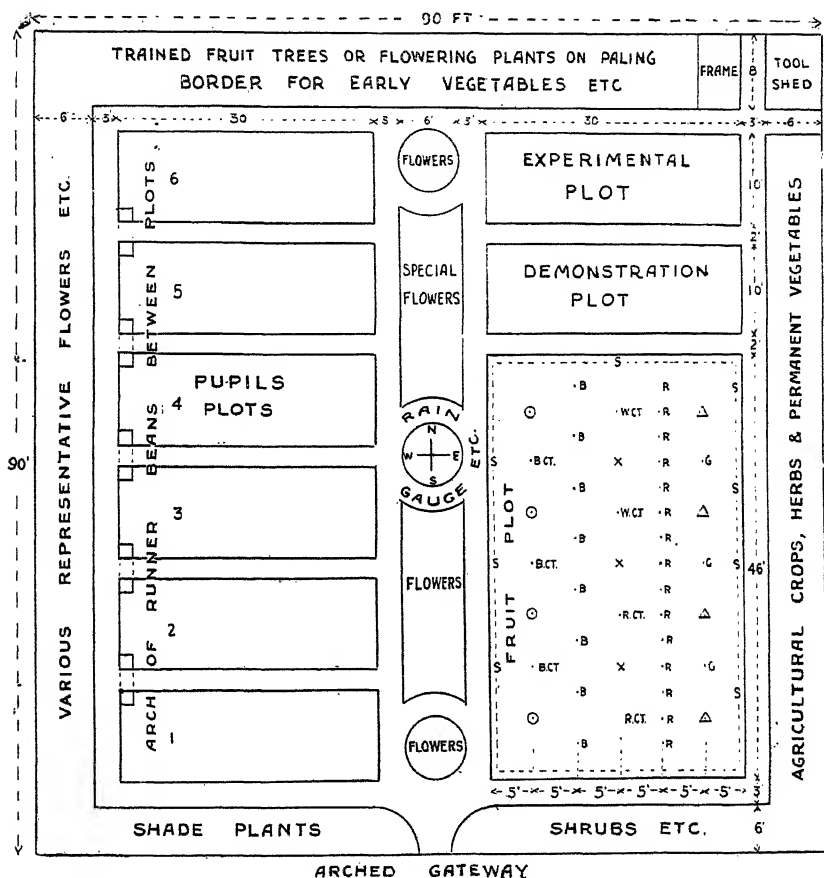
Teachers having the necessary Experimental Science qualifications, who desire to teach this subject as a recognised subject in Irish schools, must first attend one of the First Year summer courses in the subject, held either at the Royal College of Science, Dublin, with Kingstown and Glasnevin as centres for the practical gardening work of the course, or at one of the approved local centres held under Technical Instruction Committees, during the autumn, winter, and spring months, on Saturdays, or other suitable day. After satisfactory attendance at a first year's course which includes regularity of attendance, general excellence in theoretical and practical work, with satisfactory notebooks, and efficiency in the written and practical examinations, provisional certificates are awarded, after which the teachers can take up the subject in their own schools, but can only continue doing so provided that they also attend a second year course in the subject, after the satisfactory completion of which full certificates are awarded. It is interesting to note that in addition to the centres mentioned, teachers-in-training at Marlborough Hall College, Glasnevin, Dublin, also receive instruction in this subject.

The schemes of instruction in Ireland both for the training of teachers and for the training of pupils in National Schools, are very similar, and are based on the Programme set out in the Circular of the Department of Agriculture and Technical Instruction for Ireland.\*

Briefly, the subject may be said to centre around the life-story of a typical garden plant, from the embryo or seed stage to the fruiting and seed-dispersal stages, in seasonal order. Experiments are carried out to demonstrate the factors governing the germination and growth of seeds, the nutrition, growth and functions of roots, stems, leaves, flowers and fruits, with observations on the habits and modes of life of plants in relation to their surroundings. The influence of cultivation upon the organs of plants, with some

\* See pp. 450-54.

## RURAL SCIENCE AND SCHOOL GARDENING.



### KEY TO FRUIT PLOT.

- |  |  |
|--|--|
| <p>O = 4 Apples 12 ft. apart.</p> <p>Δ = 4 Pears 12 ft. apart.</p> <p>W.CT. = 2 White Currants</p> <p>G. = 4 Gooseberries.</p> | <p>X = 3 Plums 12 ft. apart.</p> <p>B.CT. = 3 Black Currants.</p> <p>R.CT. = 2 Red Currants.</p> <p>B. = 8 Brambles or Loganberries.</p> <p>R. = 15 Raspberries 3 ft. apart</p> <p>S. = 100 Strawberries 18 in. apart as a Border.</p> |
|--|--|

Fig. 1.—Plan of Small School Garden.

# RURAL SCIENCE AND SCHOOL GARDENING.

CROPS		SPACE FOR EACH CROP	INTER CROPS	SUCCESS- SIONAL CROPS
	PARSLEY	6"		
50 SEEDS	FRENCH BEANS	2 FT.	LETTUCE	BROCCOLI
10 SETS	POTATOES (EARLY)	2 FT.		KALE
10 SETS	POTATOES	2 FT.		
20	TURNIPS	1 FT. 3"	SPINACH	
6	SAVOY CABBAGES	2 FT.	MUSTARD	
6	BRUSSELS SPROUTS	2 FT.		
20 SEEDS	BROAD BEANS	2 FT.	LETTUCE	BROCCOLI
6	EARLY CABBAGES	2 FT.		LEEKs
6	EARLY CAULIFLOWERS	2 FT.	CRESS	LEEKs
6	RED CABBAGES	2 FT.		
100 SEEDS	DWARF PEAS	2 FT.	LETTUCE	BROCCOLI
20	PARSNIPS	1 FT. 3"	LETTUCE	
20	CARROTS	1 FT.	RADISH	
20	BEET	1 FT. 3"		
20	ONIONS	1 FT.		
20	SHALLOTS	9"	RADISH	SAVOY
	FLOWERS IN CLUMPS (HARDY ANNUALS)	3 FT.		

Fig. 2.—Enlarged Plan of a Pupil's plot showing crops cultivated.

knowledge of the different kinds of soil, their origin, and component parts is also dealt with. The different methods of soil cultivation, such as digging, trenching, manuring, hoeing, and raking, are done by the pupils themselves, as also is all the work necessary for the cultivation of vegetables, flowers, and fruits.

The course is fully experimental both in the classroom and in the garden; the objects of each experiment, method of cultivation, etc., are noted and the results compared, or, better still, experiments are carried out and deductions made from the results obtained.

Something is also learned of the atmosphere and the weather, and of the local river system, etc. The treatment of the common types of insect pests and plant diseases—after gaining some knowledge of their life histories—is also carried out by the pupils when they have reached the advanced stages in the course of instruction. Nature study rambles are usually held at occasional intervals.

School gardens are laid out in a variety of ways, the methods of planning depending mainly upon (1) the number

**Plan of a Typical School Garden.** of pupils who desire to take up the subject, (2) the size and shape of the available ground, and (3) the person who designs the plan.

The sketch plan shown (see Fig. 1) will give some idea as to the general arrangement of a small school garden 30 yards square, covering about three-sixteenths of an acre of ground. In such a garden from 12 to 16 pupils can be accommodated in the first year's course. In addition to the pupils' plots provision is usually made for (1) a demonstration plot, (2) a Fruit plot, and (3) Flower plots and borders, and where possible space is reserved for Farm seeds, Herbs, permanent vegetables—such as Rhubarb—and Flowering Shrubs, etc.

While school gardens are of necessity severely rectangular in plan and appearance owing to the number of rectangular plots for pupils' use, the adoption of archways here and there, the use of pillar and climbing roses, clematis and other climbing plants, either as pillars in the flower borders or as screens against the paling, walls, etc., does much to make the gardens less formal and more picturesque in character. For the purpose of making weather observations it is customary to include some of the simple forms of meteorological instruments as permanent objects in the school garden.

Various systems are in vogue for the management of school gardens. In Ireland the general practice is to

**Managing and Cropping the Gardens.** have two pupils working on each plot. The vegetables being grown in variety, as shown in Fig. 2, or in other cases growing one type of vegetable or group of vegetables on each

plot, each plot being cultivated differently, to suit the special types of vegetables grown; this latter system seems to be more suitable for the senior pupils with previous experience in plot management. In some very small school gardens the garden is laid out as an ordinary cottage garden, and the pupils work, co-operatively, at any part of the garden, under the direction of the teacher. This system of working is also adopted for the fruit plot, flower borders, etc., under all the systems of arrangement, but after the first year of working the senior pupils only are usually delegated for this work.

In selecting the ground for school gardening purposes, nearness to the school is often the deciding factor. It

**Sites for School Gardens.** sometimes happens that the schoolmaster's garden is large enough, in which case it is often used; in some cases a portion of a field adjoining the school is taken, while in other cases it is necessary to take the ground at some distance from the school. When there happens to be a choice of sites to select from, the most suitable is taken, if possible facing south, protected from north-easterly and prevailing winds, with a rich loamy soil, well drained and having a supply of water at hand.

In forming the school garden, after a plan has been decided upon, it is usual to proceed with the fencing first of all

**Initial Operations.** —when such is necessary—and for this purpose different devices are adopted: from a thorn-hedge to barbed wire, and from a split chestnut paling to a brick wall. The pathways and plots are then pegged off. In making the paths about six inches of soil are taken out the full width of the path—slightly deeper along the centre—the soil being thrown on to the adjoining plots or to low places in the garden.

The space excavated is then partly filled up with broken bricks, etc., and as digging, etc., goes on, with the large stones which are often found; and finally when all the preliminary operations of the garden are over it is usual to fill up the remaining space with small stones or gravel, and finishing off the surface with sifted ashes, coke breeze, or fine gravel, etc. In preparing the garden for cultivation it is usual to clear away any refuse, weeds, etc., and burn all that is combustible. After which bastard-trenching or double digging is done as far as possible, this work being in some cases done by a labourer, as it is rather heavy work for those not accustomed to spade work. In old gardens this work may not be necessary.

When these operations are completed, an edging, either of plants, such as Box or Euonymus, of stones or concrete, of bricks or inverted bottles, or of boards, etc., is put into position between the pathway

RURAL SCIENCE AND SCHOOL GARDENING.

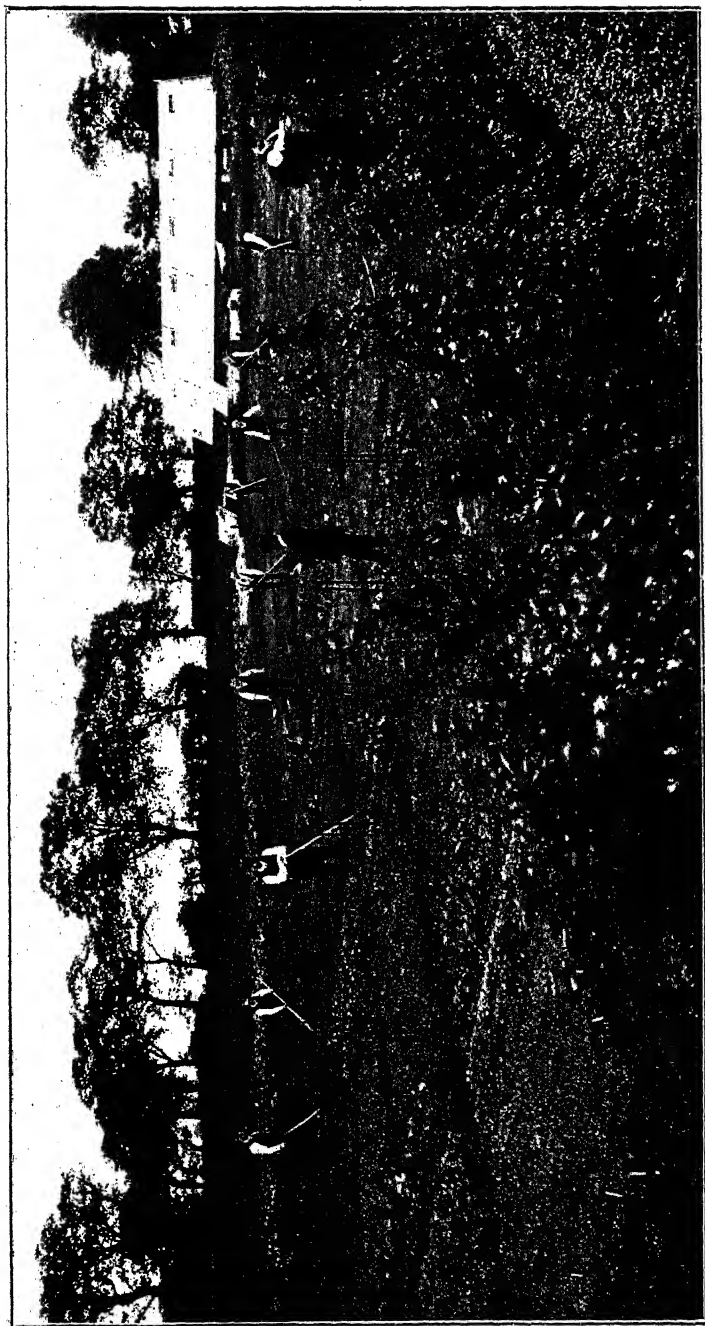


Fig. 3.—Teachers' class at work, Flush farm, Belfast.

RURAL SCIENCE AND SCHOOL GARDENING.

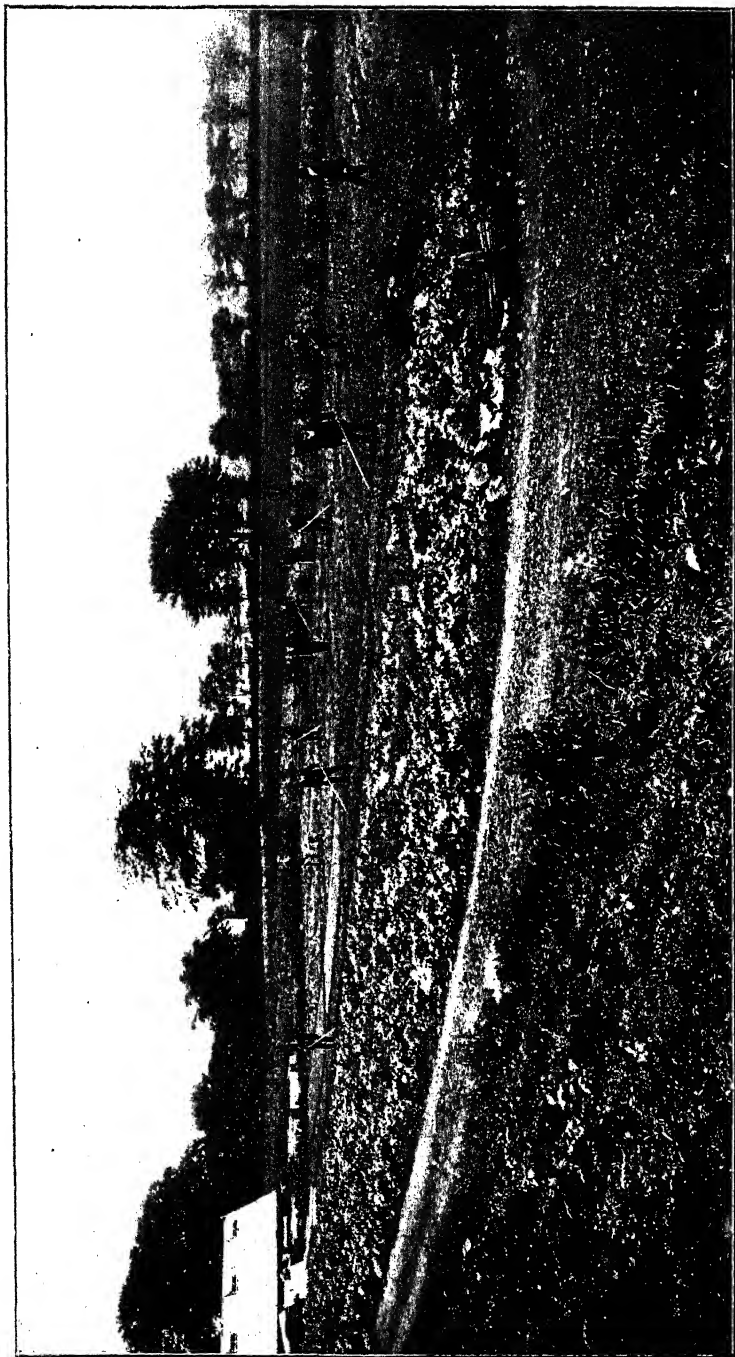


Fig. 4.—Teachers' class at work, Flush farm, Belfast. (*Another View.*)

and the garden soil, after which the ordinary planting and cropping is proceeded with. Where no shed has been previously on the ground it is customary to put up a small structure to keep the implements in, but sometimes a cellar attached to the school is used and at others a coal shed becomes transformed; nails or crooks being fixed into position, so that the complete set of implements for each plot hangs under the number of the plot. In other cases it is customary to put all the spades in one corner, the rakes in another, and so on; but this system does not so readily facilitate the checking of all the instruments and the fixing of responsibility, as does the other method, where each spade, rake, etc., is numbered according to the plot and shed system of numbering, so that it is not difficult by glancing at the implements suspended on the wall, to note the numbers and the users of dirty implements.

For a class of 12 pupils working 6 plots and other parts of the garden, the following implements are usually obtained:—6 spades, 6 forks, 6 Dutch hoes, 6 rakes, 2 draw hoes, 6 trowels, 6 small garden lines about 30 ft. long, 1 large garden line about 100 ft. long, 1 watering-can (capacity 2 gallons), 1 pruning knife, 1 budding knife, 1 syringe, 24 flower pots, about 6", 1 measuring tape (66 ft.), 1 measuring rod, 6 ft., 1 wheelbarrow or hand-barrow. The cost of these implements varies in different localities, but a £5 note will cover the cost of most of the items.

For the working of a garden with its 6 pupils' plots, etc., most of the seeds, etc., mentioned in the tabular statement on page 448 will be required, costing about £1 10s. If desired the seedsmen will, as a rule, divide the quantities stated into smaller lots, so that there will be a packet for each plot, or, in other words, the packet of say, Beet seeds, containing one ounce, will be divided into 6 smaller packets, one for each plot. Where the seeds are to be sown in seed beds for transplanting on to the plots, etc., one packet of each kind will usually be sufficient. If, however, the seeds are ordered early, in bulk, it will be a simple matter for the pupils to divide, by measuring or weighing, the seeds into six lots, or more if necessary.



QUANTITY OF SEEDS, ETC., FOR 6 PUPILS' PLOTS AND THE SCHOOL  
GARDEN GENERALLY.

Seeds, etc.	Quantity.	Number of Packets.	Approximate Cost.
Parsley . . . . .	$\frac{1}{2}$ oz.	6	0 3
Runner Beans . . . . .	$\frac{1}{4}$ pint	6	0 3
French Beans . . . . .	$\frac{1}{4}$ pint	6	0 6
Potatoes, early . . . . .	$\frac{1}{4}$ stone	1	0 9
" . . . . .	$\frac{1}{4}$ stone	1	0 9
Turnips, early . . . . .	$\frac{1}{2}$ oz.	6	0 2
Turnips, late . . . . .	$\frac{1}{2}$ oz.	6	0 2
Broad Beans . . . . .	1 pint	6	0 8
Savoy Cabbages . . . . .	$\frac{1}{4}$ oz.	1	0 2
Brussels Sprouts . . . . .	$\frac{1}{4}$ oz.	1	0 2
Early Cabbage . . . . .	$\frac{1}{4}$ oz.	1	0 2
Early Cauliflower . . . . .	$\frac{1}{4}$ oz.	1	0 4
Late Cauliflower . . . . .	$\frac{1}{4}$ oz.	1	0 4
Dwarf Peas . . . . .	$\frac{1}{2}$ pt.	6	0 4
Parsnip . . . . .	$\frac{1}{4}$ oz.	6	0 1 $\frac{1}{2}$
Carrots . . . . .	$\frac{1}{4}$ oz.	6	0 4
Beet . . . . .	1 oz.	6	1 0
Onions . . . . .	$\frac{1}{2}$ oz.	6	0 5
Shallots . . . . .	$\frac{1}{4}$ stone	6	4 6
Flower Border—Annuals . . . . .	24 packets	24	2 0
Leeks . . . . .	1 oz.	6	0 6
Lettuce, early . . . . .	$\frac{1}{2}$ oz.	6	0 4
" late . . . . .	$\frac{1}{2}$ oz.	6	0 4
Broccoli, early . . . . .	$\frac{1}{4}$ oz.	1	0 3
" late . . . . .	$\frac{1}{4}$ oz.	1	0 3
Borecole . . . . .	$\frac{1}{4}$ oz.	1	0 2
Radish . . . . .	2 ozs.	6	0 4
Mustard . . . . .	$\frac{1}{2}$ oz.	6	0 2
Cress . . . . .	1 oz.	6	0 4
Spinach . . . . .	$\frac{1}{2}$ oz.	6	0 2
Vegetable Marrow . . . . .	1 packet	1	0 3
Agricultural Seeds . . . . .	12 packets	12	0 6
Herbs . . . . .	3 packets	3	0 6
Labels . . . . .	200	1	2 6
Artificial Manures . . . . .	2 lbs. of various.	—	2 0
Farmyard Manure . . . . .	1 load	—	5 0
			<hr/> £1 6 11 $\frac{1}{2}$

It might be mentioned here that the usual custom in Great Britain is for local and district committees to provide implements, seeds, etc., out of money received from the education rates. In Scotland the Agricultural Colleges undertake to supply at practically cost price, plants, seeds, and artificial manures to the local school authorities, while somewhat similar schemes are in operation in some parts of England.

One argument put forward against the arrangement is that the requirements of the individual schools vary, and that standard collections—the seeds are usually sent out in collections for 10, 15, 20 pupils, etc.—would not contain all the seeds desired by

RURAL SCIENCE AND SCHOOL GARDENING.



Fig. 5.—View of tool presses, showing arrangement of implements. (*See p. 447.*)

RURAL SCIENCE AND SCHOOL GARDENING.

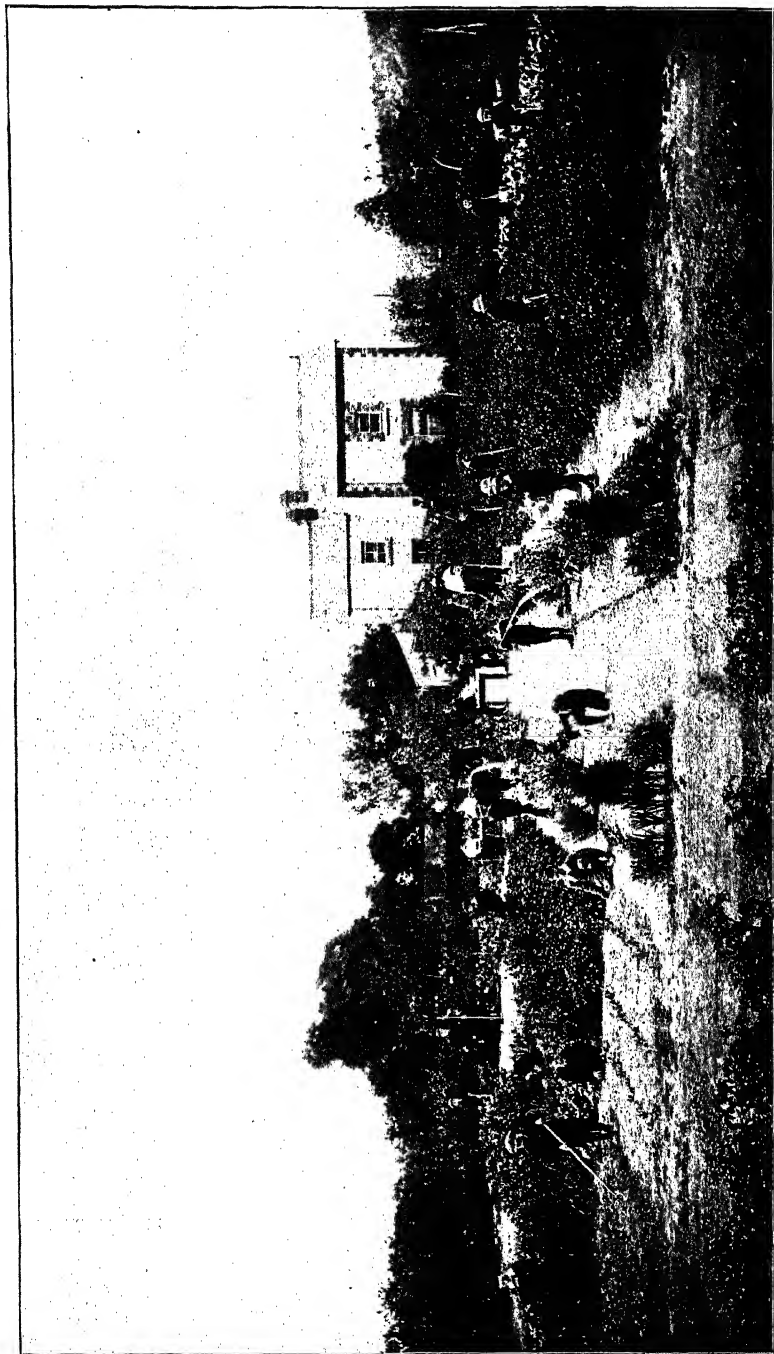


Fig. 6.—School Garden, Boys' National School, Dunleer, Co. Louth.

any one school. On the other hand, it is pointed out that such collections cost each school less than would otherwise be the case.

In order to carry out many of the experiments a science equipment is an absolute necessity. Many of the  
**Science** schools have this, and in other cases much useful  
**Equipment.** work has been done by using chalk boxes with glass fronts as observation cases, and jam-pots, tin lids, etc., for some of the soil and other experiments.

To the enthusiast there are no difficulties, and unless the teacher is an enthusiast he should leave this subject alone—still there are many who are not enthusiastic at first who become so later on.  
**Some**  
**Difficulties.**

The principal objection heard is that it is difficult to get the necessary money to finance the scheme, although the Commissioners of National Education allow grants not exceeding £6, to cover half of the initial cost, and subsequently yearly grants not exceeding £2, to cover half the certified cost of seeds, etc. Another objection is the difficulty in getting ground of a suitable nature and at a reasonable rental. A further difficulty is the management of the garden during the summer holidays. While some educational good may be done by pointing out to pupils just back from their holidays, the weedy patch and the folly of neglect, it is hardly desirable from many points of view to so neglect the garden during the holidays that weeds overrun everything.

In some cases a local labourer is brought in for a day or so a week to keep the Dutch hoe busy ; in others arrangements are made to have a number of boys working occasionally in charge of one of the seniors ; this arrangement often serves well, but much depends on the one in charge. Where the vacation extends for a short period only, a thorough cleaning up during the day before the holiday commences is all that is necessary. Another difficulty appears to be that there is hardly sufficient time to do all the science work which is considered necessary, and at the same time keep the garden work well in hand in the short time available. Perhaps this could be overcome by devoting not less than two hours per week to this subject, and during spring time more particularly allotting four hours per week.

It is possible for teachers of this subject in Ireland to earn grants from £3 to £7 10s., depending upon the standard  
**Prizes and** obtained and upon the number of pupils who  
**Grants.** regularly attend the course. Prizes up to £5 are also awarded to the teachers of the schools which have the best gardens attached in their respective group, 80 groups of at least 5 schools each being allowed for, and in those districts where

school gardens have been in operation for some years, and there are a sufficient number of school gardens, they may be arranged in groups of 10 or 15, and prizes of £5 each awarded to the two or three best schools in each group.

Various methods are adopted for the disposal of the produce grown: some is used by the teacher, more especially where his own garden has been sacrificed in order to turn it into a school garden; some is used in the cookery classes; some is given to the pupils as a reward for diligence, and the surplus is usually sold.

The question has been asked, can school gardening do anything in the way of national service during the war and after? A reference to the plan will show that School Gardening a considerable amount of vegetable produce and the War. can be grown even on such small plots.

This work, however, does not stop in the school garden; it commences there and radiates to the home and to the surrounding houses. It is a common occurrence to find school gardening pupils cultivating their own cottage gardens—too often neglected before—and producing vegetables and fruits where none were grown. It is found also that pupils who have had two years' training in school gardening give better assistance to gardeners and farmers requiring help during the rush seasons, being more amenable to discipline and taking a greater interest in their work than those not so trained. While in the towns these boys are very keen to assist in managing the allotments, some going so far as to work a whole allotment by themselves.

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*\*\* For convenience of reference the Department's Memorandum on the teaching of Rural Science is appended.*

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#### MEMORANDUM ON THE INTRODUCTION OF THE TEACHING OF RURAL SCIENCE (INCLUDING SCHOOL GARDENING) INTO NATIONAL SCHOOLS, AND THE TRAINING OF TEACHERS THEREFOR.

1. The Department have undertaken to make such provision as is possible for the training of National School Teachers to give instruction in Rural Science. With this object in view they have prepared the accompanying Syllabus and are arranging courses of instruction as follows:—

(I.) At the Royal College of Science for Ireland, Dublin, and in School Gardens in the neighbourhood, during the month of August each year; and

RURAL SCIENCE AND SCHOOL GARDENING.

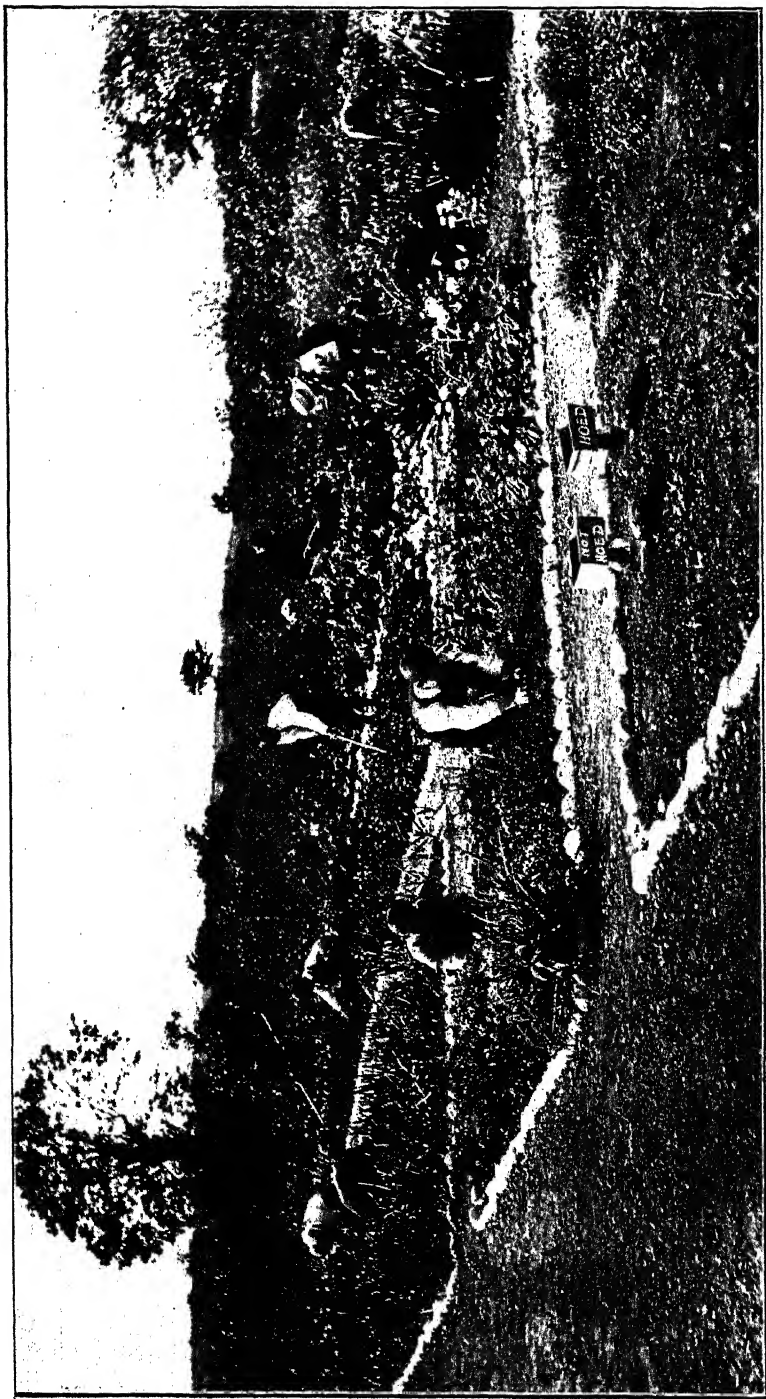


Fig. 7.—School Garden, Boys' National School, Ballinakill, Queen's Co.

RURAL SCIENCE AND SCHOOL GARDENING.



Fig. 8.—Summer Vacation Course in School Gardening for National School Teachers.

(II.) In a few selected counties where classes will be held at approved centres on one day each week during the Autumn, Winter, and Spring months.

Teachers will not be permitted to attend concurrently classes in the First and Second Year Syllabuses in Rural Science, but provisional certificates will be granted on the First Year's work, so that the teaching of the subject may be immediately introduced into the schools on the understanding that teachers so recognised will attend the second year course in the following year. Certificates of Proficiency granted under this scheme will be accepted by the Commissioners of National Education as evidence of qualification to give instruction in the subject in National Schools.

2. Except under special circumstances, only those teachers will be admitted to these courses of instruction who have been recognised by the Commissioners of National Education as qualified to teach the Syllabuses of Elementary Experimental Science and Object Lessons of the Commissioners' Programme, having successfully attended :—

(a) One of the Special Courses of instruction in Experimental Science and Object Lessons conducted by the Board's Organiser of Experimental Science, or his assistants ; or,

(b) The full two years' course for King's Scholars at one of the Training Colleges recognised by the Commissioners ; or,

(c) Classes in the first and second year syllabuses in Elementary Science (Teachers) at a Technical School under the Department of Agriculture and Technical Instruction.

3. The courses of instruction referred to at 1 (II.) above will be organised in conjunction with local Technical Instruction Committees. Any National Teacher qualified under the terms of paragraph 2 above will be eligible for admission to these courses, but, in the case of teachers who have previously received the approval of the Commissioners of National Education, the Commissioners undertake the payment of travelling expenses in connection with their attendance at the course, and will also afford facilities for the teachers attending the course, provided that the granting of such facilities will not interfere with the regular work of the School in which the teachers are employed.

4. The courses of instruction referred to at 1 (I.) above will be conducted under the conditions of Form S. 41 (Summer Courses of Instruction for Teachers). A limited number of teachers will be admitted to the courses on the nomination of the Commissioners of National Education. Teachers who attend the course regularly and punctually will receive, from the Department of Agriculture and Technical Instruction, Third Class railway fare for one journey



each way between the station nearest their school and Dublin (provided that the distance exceeds 20 miles), and a sum of £3 10s. 0d. towards their expenses whilst attending the course, which will extend over 24 or 25 days.

## SYLLABUS IN RURAL SCIENCE (INCLUDING SCHOOL GARDENING).

### FIRST YEAR COURSE.

#### *Section I.*

A.—The life story of a typical garden plant; fundamental, outstanding facts with respect to nutrition, growth and reproduction.

Garden demonstration on the various forms assumed by plant organs and the more obvious purposes served by such modifications.

Observations upon the habit and modes of life, the soil and situation and the distinctive competing characters of the wild plants found in the garden and its surroundings. Racial variations, illustrated by the cabbage and its garden varieties (kale, cabbage, savoy, broccoli, cauliflower, Brussels sprouts, kohlrabi).

Importance of sowing only the best seeds carefully selected from the best parents.

Influence of external factors in producing a good yield, or other desired result.

Preliminary notions as to the physical characters of the soil demanded by the cultivated plants. The origin and nature of soils. The conditions under which the soil may best include air and water available for the plant.

#### *Section II.*

B.—Preparation of the soil for cultivated plants. Nature of a seed and the physiology of germination. Seed-sowing and the care of seed-beds. Garden observations on the growth and development of seedlings. Pricking off and transplanting seedlings, thinning, hoeing, weeding, etc. Cropping a vegetable garden, theory of rotation. Garden demonstration on annuals, biennials, and perennials.

C.—Simple studies in the gross (naked eye) anatomy and physiology of roots and shoots. (Demonstrations on the character and relative positions of the various systems of tissues and on camoses, root-pressure, ascent of soil water through living wood, etc.) Detailed study of the "fruiting" branches of orchard trees and bushes. Principles and practice in pruning, budding, and grafting. Propagation by layers, runners, bulbs, etc. Study of flowers. How flowers are naturally fertilised. Use of bees. Practice in the artificial fertilisation of plants. Hybrids. Importance of selection in only using seeds of a good "strain."

Planting out decorative plants in beds and borders. Staking and tying. Practice in planting shrubs and fruit trees. Hints on making the home beautiful.

D.—Examination of the root system of a few typical plants usually grown in pots. Preparation of potting soils for various classes of plants. Practice in potting plants. Laboratory and garden experiments in transpiration. Influence of habitat upon rate of transpiration. Comparison of well-selected examples of the following three distinctive types of plants :—(1) aquatic ; (2) ordinary garden soil ; (3) rock or other dry situation. Principles of practice in watering plants. Improvement of soils, drainage, trenching, digging, hoeing.

The food of plants. Principles of manuring. Natural and artificial manures. Leaves and their work. Blanching. Garden demonstration on the influence of light upon vegetation. How to use school gardens as an instrument of education in rural schools.

## SECOND YEAR COURSE.

### *Section I.*

A.—Management of a school garden, followed by a discussion on best methods based on a year's experience. Schemes of cropping. Utilisation of garden for "object" lessons.

Treatment of unhealthy plants and of crops suffering from fungus and insect attacks. Preparation of spraying mixtures and exercises in spraying.

Exercises in the culture of a number of selected subjects, such as ferns, room and window plants, bulbs, etc.

### *Section II.*

B. 1. *The School Garden in relation to its surroundings.*—North and South. The Compass Needle. Survey of the Garden. The roadways leading to the School. Simple methods of making maps. The garden as shown on the maps of the Ordnance Survey. Height above sea level. The garden as a part of Ireland, and as a point on the surface of the globe.

B. 2. *The Atmosphere and the Weather.*—Constitution of the atmosphere. Dry air and air partly formed of water vapour. Weight of the air as measured by a barometer. Effect of the sun's rays on the earth and on the air around it. The Seasons in the School Garden. Height of the sun at noon at different times of the year ; effect of this on the temperature of the soil. Influence of aspect on the garden. Temperature of the air above the garden ; the registering thermometer. Causes of variations in the pressure

of the air. Winds. The moisture of the air ; clouds and why they appear to gather round the mountains. Dew and hoar frost, rain and snow. Rainfall and the rain gauge. The local climate and its causes.

B. 3. *The Slopes of the Hills*.—Action of frost and rain. Stones on the mountain slopes. Rain grooves and temporary streams. Downwash of fine material. The form of the hill sides. Glaciers of ancient days and their deposits ; how they spread into the lowlands. Drumlins. The greenhills of the Irish plain. The vegetation characteristic of hills and moorlands.

B. 4. *The Local River System*.—Surface rills and emerging springs. Union of streamlets to form rivers. Their courses on the map. Regions of excavation and deposition. Waterfalls, ravines, and potholes. Material carried visibly and invisibly. Alluvium and river terraces. Meanders in the plain. Water plants and the vegetation covering recent alluvium deposits.

C. 1. *The Lowlands and the Shore*.—How every highland may become worn down to a plain. Effects of earth movement on the river system ; a lowering checks flow and excavation, and encourages deposition ; an elevation allows of renewed excavation. Evidences of earth movement along the coast. Raised beaches due to elevation ; long sea inlets due to depression. Sand dunes. Loss of land under the battery of the sea. Bays and sand splits. Maritime plants and the vegetation of sand hills by the sea.

C. 2. *How the Rocks of the country were made*.—Granite and Basalt ; molten matter in the cauldrons of the earth. Sands in desert plains and on the shore. Mud banks and clays. Deposits of dead shells. Sand stone, clay, and limestone. Remains of plants and animals in rocks. Earth movements and earth crumplings of ancient times. Baking of rocks by invasions of molten matter ; the crystalline schists of western Ireland. Observations upon the making of soils, influence of vegetation.

D.—*Animals of the Garden*.—Distinguishing external characters of earth-worm, slug, snail, any typical insect, spider, bird, mouse. How the earth-worm helps the gardener in cultivating his soil. Life-history of an insect. How to distinguish between a biting and a sucking insect. Identification of centipedes, millipedes, beetles, aphides, etc. Usefulness of insect-eating birds in garden. Protection of crops against birds at certain critical periods of the year. General fieldwork.

## WINTER EGG RECORDS, 1915-16.

In the issue of the JOURNAL, Vol. IX., No. 4, an article appeared dealing with Winter Egg Records and giving a number of records for the period October, 1908—March, 1909. Further articles in the JOURNAL, Vol. X., No. 3, Vol. XI., No. 3, Vol. XII., No. 3, Vol. XIII., No. 3, Vol. XIV., No. 3, and Vol. XV., No. 3, set forth the results for the six monthly periods October, 1909—March, 1910, October, 1910—March, 1911, October, 1911—March, 1912, October, 1912—March, 1913, October, 1913—March, 1914, and October, 1914—March, 1915, respectively. Some records for last winter—October, 1915—March, 1916—are given in the accompanying Tables. The results for the seven winter seasons are shown in the following Table :—

Name of Breed.	Oct., 1909 to March, 1910.	Oct., 1910 to March, 1911.	Oct., 1911 to March, 1912.	Oct., 1912 to March, 1913.	Oct. 1913 to March, 1914.	Oct., 1914, to March, 1915.	Oct., 1915 to March, 1916.
White Leghorns	39.7	41.5	45.1	42.4	47.4	49.5	50.2
Brown Leghorns	42.1	37.9	49.3	51.8	38.1	—	—
Black Leghorns	—	—	—	64.3	—	—	—
Minorcas	38.0	48.3	48.3	86.3	60.5	45.9	50.5
Buff Orpingtons	42.4	45.2	42.6	49.1	58.6	42.8	52.0
White Orpingtons	48.7	54.1	52.6	44.1	38.6	35.4	43.4
White Wyandottes	34.2	45.2	45.8	42.9	33.9	35.8	41.4
Faverolles	41.5	35.7	28.8	42.2	34.9	28.7	32.9
Plymouth Rocks	39.2	45.5	36.5	43.1	38.8	32.9	38.0
Anconas	—	—	64.9	—	—	—	—
Houdans	58.5	62.5	58.0	75.8	46.4	51.8	62.0
Andalusians	71.3	—	—	—	—	—	—
Rhode Island Reds	—	63.9	61.9	49.1	48.4	45.9	41.4
Light Sussex	32.1	39.8	41.8	38.4	49.7	33.6	38.3
Red Sussex	—	—	—	—	32.5	28.5	30.7
Mixed Breeds	41.9	40.5	41.6	43.7	42.4	41.7	42.6
General Averages	40.7	42.7	41.8	44.2	42.2	40.4	42.4

Omitting the breeds of which the returns relate to less than 100 birds, we have the following figures :—

White Leghorns	50.2
White Wyandottes	41.4
Faverolles	32.9
Plymouth Rocks	38.0
Rhode Island Reds	41.4
Mixed Breeds	42.6

It will be seen that White Leghorns show the best results.

The great variations in results due to strain which have been continually pointed out in the articles relating to Importance Egg Records, still show themselves as markedly of Strain, as ever, as will be seen from the following Table :—

Name of Breed.	Average of all the flocks.	Average of best flock.	Average of worst flock.
White Leghorns, . . .	50.2	81.5	32.3
White Wyandottes, . . .	41.4	43.9	35.7
Faverolles, . . .	32.9	40.3	23.3
Plymouth Rocks, . . .	38.0	58.0	20.6
Rhode Island Reds, . . .	41.4	63.0	23.1
Mixed Breeds, . . .	42.6	79.3	5.3

The importance of strain is thus again brought out.

## EGG RECORDS.—WINTER 1915-6.

### SUMMARY TABLE.

Name of Breed.	October.		November.		December.		January.		February.		March.		Total of Monthly Averages.
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	
White Leghorns . . .	198	6.7	221	4.2	267	5.3	365	7.3	374	10.5	426	16.2	50.2
Minorcas, . . .	69	7.1	97	2.2	87	0.9	8	9.6	82	12.4	82	18.3	50.5
Buff Orpingtons, . . .	46	5.1	42	6.1	40	6.2	41	10.9	39	11.4	40	12.3	52.0
White Orpingtons, . . .	60	5.3	63	2.6	69	5.0	68	6.5	63	9.9	57	14.1	43.4
White Wyandottes, . . .	133	3.5	133	1.6	138	3.1	125	5.7	125	11.2	108	16.3	41.4
Faverolles, . . .	92	3.3	106	1.7	106	3.3	120	4.7	119	5.9	119	14.0	32.9
Plymouth Rocks, . . .	294	4.7	323	2.1	336	3.0	348	6.8	337	8.4	322	13.0	38.0
Houdans, . . .	12	8.4	12	7.3	12	8.2	12	10.3	12	10.3	12	17.5	62.0
Rhode Island Reds, . . .	289	4.8	292	2.8	277	3.9	220	7.5	235	9.1	212	13.1	41.4
Light Sussex, . . .	55	4.0	56	6.1	67	4.3	67	5.6	62	7.8	62	10.5	38.3
Red Sussex, . . .	74	2.5	73	0.9	105	2.2	96	5.5	95	9.2	91	10.4	30.7
Mixed Breeds, . . .	1,747	4.4	1,943	3.0	1,962	4.9	1,872	7.4	1,869	9.7	1,884	13.2	42.6
Totals, . . .	3,069	4.6	3,361	2.9	3,466	4.4	3,417	7.2	3,412	9.6	3,415	13.7	42.4

## WHITE LEGHORNS.

Number.	October.		November.		December.		January.		February.		March.		Total of Monthly Averages.
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	
1	30	5.0	30	2.9	34	3.7	32	7.8	31	10.9	30	18.8	49.1
2	26	1.2	27	0.7	36	3.9	36	11.2	36	11.5	35	16.1	44.6
3	33	9.4	50	9.2	50	9.3	53	11.2	54	20.1	53	21.8	81.5
4	15	26.7	15	6.4	30	3.2	30	11.2	40	11.2	40	20.6	79.3
5	33	4.9	33	3.7	33	6.2	40	6.1	40	12.4	45	17.7	51.0
6	27	1.9	28	0.0	23	0.0	40	5.4	40	8.6	40	16.4	32.3
7	11	9.1	14	4.7	31	7.1	31	9.2	31	5.0	87	12.8	47.9
8	23	5.7	24	3.3	25	4.1	23	13.6	23	19.0	20	20.9	66.6
9	—	—	—	—	—	—	80	0.3	79	2.8	76	9.5	—
Totals,	198	6.7	221	4.2	267	5.3	365	7.3	374	10.5	426	16.2	50.2

## MINORCAS.

1	19	8.4	47	0.0	45	0.0	41	6.1	40	10.5	40	15.6	40.6
2	42	7.4	42	4.6	42	1.8	42	13.0	42	14.3	42	20.9	62.0
3	8	2.5	8	3.1	—	—	—	—	—	—	—	—	—
Totals,	69	7.1	97	2.2	87	0.9	83	9.6	82	12.4	82	18.3	50.5

## BUFF ORPINGTONS.

1	46	5.1	42	6.1	40	6.2	41	10.9	39	11.4	40	12.3	52.0
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## WHITE ORPINGTONS.

1	27	5.1	27	2.5	33	3.6	32	5.0	27	10.7	21	20.0	46.9
2	33	5.4	36	2.7	36	6.2	36	7.8	36	9.4	36	10.6	42.1
Totals,	60	5.3	63	2.6	69	5.0	68	6.5	63	9.9	57	14.1	43.4

## WHITE WYANDOTTES.

	October.		November.		December.		January.		February.		March.		Total of Monthly Average.
Number.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	
1	22	6.1	22	3.5	22	8.6	—	—	—	—	—	—	—
2	30	4.0	30	0.3	30	0.1	30	4.9	30	10.3	30	16.1	35.7
3	48	2.0	48	1.3	48	2.3	48	5.0	48	10.3	48	15.4	36.3
4	33	3.5	33	1.8	31	2.5	30	5.0	30	13.3	30	17.8	43.9
5	—	—	—	—	7	8.0	7	12.6	7	9.0	—	—	—
6	—	—	—	—	—	—	10	9.3	10	13.3	—	—	—
Totals,	133	3.5	133	1.6	138	3.1	125	5.7	125	11.2	108	16.3	41.4

## FAVEROLLES.

1	35	4.0	35	2.9	35	3.9	35	4.6	34	5.3	34	15.1	35.8
2	20	4.1	21	2.3	21	6.5	21	8.4	21	7.9	21	11.1	40.3
3	27	2.9	40	0.0	40	0.0	40	3.8	40	4.7	40	11.9	23.3
4	10	0.4	10	3.0	10	7.5	24	3.1	24	7.0	24	18.5	39.5
Totals,	92	3.3	106	1.7	106	3.3	120	4.7	119	5.9	119	14.0	32.9

## PLYMOUTH ROCKS.

1	23	2.7	25	2.0	26	5.5	25	12.8	22	7.7	20	13.4	44.1
2	8	0.0	—	—	—	—	10	7.6	14	7.1	14	11.1	—
3	25	6.5	32	2.8	32	3.5	30	8.2	20	7.4	30	12.1	40.5
4	23	1.3	22	1.0	21	2.3	21	7.2	20	10.2	20	12.9	34.9
5	42	4.3	41	2.9	44	1.3	41	2.2	41	6.3	36	9.5	26.5
6	25	0.7	30	2.5	34	1.8	34	3.6	34	3.9	34	8.1	20.6
7	18	9.0	13	7.3	21	4.2	24	9.5	24	13.8	24	14.2	58.0
8	30	4.7	36	0.8	35	6.1	34	12.1	34	10.7	25	20.8	55.2
9	77	2.7	87	0.8	86	1.9	92	5.2	82	9.6	84	14.3	34.5
10	23	11.2	37	3.6	37	3.5	37	6.6	36	7.8	35	12.7	45.4
Totals,	294	4.7	323	2.1	336	3.0	348	6.8	337	8.4	322	13.0	38.0

## HOUDANS.

Number.	October.		November.		December.		January.		February.		March.		Total of Monthly Averages.
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	
1	12	8.4	12	7.3	12	8.2	12	10.3	12	10.3	12	17.5	62.0

## RHODE ISLAND REDS.

1	35	3.9	34	0.0	33	2.5	33	8.8	33	9.8	33	10.5	35.5
2	34	1.8	34	2.1	34	1.9	33	1.8	33	4.3	33	11.2	23.1
3	22	6.9	22	6.2	24	5.7	24	7.9	25	10.5	23	14.6	51.8
4	44	6.3	47	3.0	36	4.2	36	8.9	36	13.4	32	16.7	52.5
5	19	9.2	19	4.0	19	1.2	19	0.0	32	5.0	32	10.6	30.0
6	20	3.9	22	0.6	22	2.7	22	4.4	22	12.9	20	17.5	42.0
7	31	7.4	31	8.1	31	9.6	35	14.2	34	10.1	30	13.6	63.0
8	60	2.0	60	0.7	60	0.0	—	—	—	—	—	—	—
9	10	1.3	8	2.9	8	6.5	8	5.1	9	8.9	9	10.1	34.8
10	14	10.0	15	5.2	—	—	—	—	—	—	—	—	—
11	—	—	—	—	10	20.7	10	15.4	11	9.8	—	—	—
Totals.	289	4.8	292	2.8	277	3.9	220	7.5	235	9.3	212	13.1	41.4

## LIGHT SUSSEX.

1	20	6.3	21	5.7	22	5.1	22	7.9	22	7.4	22	7.8	40.2
2	35	2.7	35	6.3	45	4.0	45	4.4	40	8.1	40	11.9	37.4
Totals.	55	4.0	56	6.1	67	4.3	67	5.6	62	7.8	62	10.5	38.3

## RED SUSSEX.

1	48	3.8	47	1.4	47	1.3	36	5.4	36	9.6	34	10.6	32.1
2	26	0.0	26	0.0	28	2.2	30	2.6	29	6.1	27	7.1	18.0
3	—	—	—	—	30	3.5	30	8.5	30	11.7	30	13.2	—
Totals.	74	2.5	73	0.9	105	2.2	96	5.5	95	9.2	91	10.4	30.7



## MIXED BREEDS.

Number.	October.		November.		December.		January.		February.		March.		Total of Monthly Averages.
	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	Number of Hens.	Average Number of Eggs laid per Hen.	
1	42	4.3	34	6.4	34	8.3	30	9.6	30	13.3	30	17.5	59.4
2	57	2.8	54	1.7	51	4.3	51	6.4	51	8.3	48	14.0	37.5
3	48	1.5	55	1.0	—	—	—	—	49	7.0	49	7.6	—
4	60	2.6	50	1.2	50	6.0	50	7.3	50	11.1	50	15.8	44.0
5	60	7.4	60	4.6	60	7.0	74	8.7	70	13.7	70	20.3	61.7
6	32	8.1	35	1.9	42	5.0	40	10.3	39	12.7	37	17.5	55.5
7	32	3.9	40	2.2	40	7.5	40	10.2	58	6.9	57	14.7	45.4
8	70	4.2	70	1.4	66	2.1	—	—	—	—	—	—	—
9	45	0.6	45	2.3	45	11.9	—	—	—	—	—	—	—
10	56	2.8	53	0.1	50	1.0	50	1.0	47	2.0	45	1.1	8.0
11	39	2.9	37	5.6	40	6.9	43	9.7	44	13.2	40	15.9	54.2
12	45	2.6	50	4.3	48	10.6	51	13.8	59	15.4	59	13.2	59.9
13	47	3.0	46	3.0	45	0.3	47	0.4	47	2.6	44	6.0	15.3
14	44	4.0	57	0.9	56	2.2	40	6.1	42	8.8	46	9.7	31.7
15	64	4.4	64	1.1	74	1.6	83	3.4	83	7.9	68	13.9	32.3
16	30	8.9	31	4.4	31	5.1	32	5.3	33	8.6	35	10.9	43.2
17	60	8.5	60	6.5	60	8.5	60	11.9	60	12.5	60	1.2	65.1
18	22	1.4	20	0.0	20	0.0	20	0.9	20	2.0	20	1.0	5.3
19	30	5.4	28	0.6	26	3.4	39	5.9	38	8.6	38	10.6	34.5
20	23	2.5	23	1.9	33	4.2	23	8.8	23	9.7	23	9.0	36.1
21	21	1.1	21	0.0	20	1.1	20	6.5	27	10.2	25	15.5	34.4
22	34	2.0	33	1.8	33	0.0	32	2.2	33	7.3	33	9.9	23.2
23	30	7.2	30	2.1	40	3.6	45	4.6	45	9.5	40	7.1	34.1
24	16	5.1	16	5.3	31	2.0	30	7.3	30	8.9	35	12.7	41.3
25	63	6.4	62	3.0	80	4.6	84	8.4	82	9.0	80	16.2	47.6
26	22	0.0	22	0.0	22	0.0	22	0.0	22	8.4	30	9.1	17.5
27	23	1.1	22	0.0	22	0.8	22	7.0	23	10.0	23	13.4	32.3
28	60	4.0	80	1.5	80	5.7	89	7.8	80	12.1	70	14.4	45.5
29	28	6.0	28	5.9	30	11.3	32	16.2	32	17.9	32	22.0	79.3
30	81	3.8	84	2.4	75	7.0	97	7.8	97	10.0	99	12.9	43.9
31	7	8.0	13	2.0	13	1.7	13	5.4	12	4.3	13	7.2	28.6
32	30	0.5	34	0.9	44	3.8	48	4.4	42	8.5	37	8.7	26.8
33	39	1.5	37	0.0	39	0.0	39	0.3	44	0.7	44	6.5	9.0
34	34	4.4	34	1.4	34	1.0	34	2.4	34	4.9	21	9.3	23.4
35	30	0.7	37	0.0	34	0.8	—	—	—	—	—	—	—
36	120	5.4	120	4.2	120	3.8	120	5.1	120	9.4	120	13.7	41.6
37	42	2.5	42	8.6	50	4.8	46	7.7	46	12.0	60	10.0	45.6
38	77	9.3	165	5.3	170	10.3	170	13.6	170	13.6	173	16.9	69.0
39	19	6.8	19	1.3	18	3.3	18	7.3	17	5.9	—	—	—
40	46	6.9	45	4.1	48	5.3	5	8.5	44	9.8	47	11.5	46.1
41	19	9.1	27	3.0	28	6.4	27	7.1	26	11.2	23	17.7	54.5
42	—	—	60	7.2	60	2.4	60	8.1	—	—	60	19.8	—
Totals,	1,747	4.4	1,943	3.0	1,962	4.9	1,872	7.4	1,869	9.7	1,884	13.2	42.6

## OFFICIAL DOCUMENTS.

### I.—AGRICULTURE.

FORM A. 133 (a).

1916.

#### DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

#### ROYAL COLLEGE OF SCIENCE, DUBLIN, SESSION 1916-17.

#### SCHOLARSHIPS IN AGRICULTURE, HORTICULTURE, FORESTRY, AND CREAMERY MANAGEMENT.

A limited number of scholarships will be offered in 1916 for competition among young men in Ireland who desire to acquire a thorough knowledge of Technical Agriculture, and, in addition, one or more scholarships will be provided for students who intend to specialise in either Horticulture, Forestry, or Creamery Management. Each scholarship includes—(1) free admission to the first year's course of instruction in the College, (2) one third-class railway fare to Dublin at the beginning of the session, and one third-class fare from Dublin at the end of the session, and (3) free board and residence at the Albert Agricultural College.

Each holder of a scholarship must deposit with the Principal of the Albert Agricultural College at the beginning of each session a sum of £3 to cover the cost of repairs to clothing and of books and stationery. The unexpended balance, if any, of this deposit will be returned at the close of the session.

A scholarship is tenable for one year, but selected candidates must undergo a probationary course of one term of about three months. If satisfactory progress be made by the holder, the scholarship may be renewed for a second, a third, and a fourth year, to enable the student to complete his course.

The Department do not undertake to employ, or find employment for, students at the close of the period of training.

Holders of these scholarships will be subject to the regulations made from time to time at the Royal College of Science, and will be required to devote their whole time to the course of study prescribed for them by the Department.

Candidates, who should be between 18 and 30 years of age on the 1st September, 1916, must make application on a form, which may be obtained from the Secretary, Department of Agriculture and Technical Instruction for Ireland, Dublin, or the Registrar, Royal College of Science for Ireland, Dublin, after the 1st February, 1916, and which should be returned not later than the 31st July, 1916.

Candidates must have been born in Ireland, or have been resident in Ireland for three years immediately prior to the 1st September, 1916.

Past and present students of the Royal College of Science for Ireland are ineligible as candidates.

The examination will take place in Dublin on the 9th, 10th, and 11th August, 1916. No expenses in connection with attendance at this examination will be allowed.

The subjects for the examination are :—

- (1) English.
- (2) *One* of the following : Latin, Irish, French, *or* German.
- (3) Mathematics.
- (4) Drawing.
- (5) *One* of the following :—Agriculture, Horticulture, Forestry, *or* Dairying and Creamery Management.

#### SYLLABUSES OF THE EXAMINATION.

The examination in each language other than English will include passages to be translated into English from the books prescribed, together with questions in grammar and colloquial phrases, and a passage to be translated from English into the language selected. The books prescribed are :—

##### ENGLISH.

1. English Composition.
2. Literature.

SHAKESPEARE : Julius Cæsar (School Edition). (Philological questions will not be asked.)

POPE : Homer's Iliad, Books XXI and XXII.

MACAULAY : Life of Goldsmith.

3. Outlines of History :

Europe, with special reference to Ireland, Great Britain, and France, A.D. 1603 to A.D. 1748.

4. Geography :

(a) Asia and Africa.

(b) The British Empire in Asia and Africa, in more detail.

##### LATIN.

VIRGIL : Æneid, Book XII.

CICERO : In Catilinam, I and II.

## IRISH.

**SHEEHAN :** Cnuasraíocht Tráda.

**O'LEARY :** An Cleasruíde.

## FRENCH.

**MÉRIMÉE :** Tamango.

**LABICHE :** Le Baron de Fiurchevif.

**MOFFATT :** French Science Course (University Tutorial Press).

## GERMAN.

**GERSTÄCKER :** Germelshausen (School Text).

**GOETHE ;** Erlkönig, Mailed, Der Sänger, Der Schatzgräber, Kennst de das Land, Nur Wer die Sehnsucht kennt, An den Mond, Der König in Thule, Wandrers Nachtlied I and II.

**KORNER :** Andreas Hofers Tod, Mein Vaterland, Gebet während der Schlacht, Schwertlied.

**MOFFATT :** German Science Course (University Tutorial Press).

## MATHEMATICS.

**ARITHMETIC.**—The first four rules, simple and compound; reduction, including metric system; unitary method in proportion; vulgar fractions; decimals; practice; simple and compound interest; square root; calculation of rectangular areas and rectangular volumes, percentages; profit and loss; averages and mixtures; the use of logarithms. (The use of algebraical symbols and methods is permitted.)

**ALGEBRA.**—Addition, subtraction, multiplication, and division of algebraic integers; graphical representation of algebraic expressions and easy problems thereon; algebraic fractions; simple equations in one unknown quantity and problems thereon; simple equations involving two or more unknown quantities and the problems thereon; quadratic equations in a single unknown quantity and easy problems soluble by such equations; elementary theory of indices and logarithms.

**GEOMETRY.**—An amount of geometrical knowledge approximately equivalent to that contained in Euclid, Books I., II., and III.—Deductions.

**TRIGONOMETRY.**—General definitions of the trigonometrical functions: elementary identities, determination of the numerical

values of the trigonometrical functions of  $30^\circ$  and  $45^\circ$  and their multiples; solution of right-angled triangles; rule of sines; formula for the cosine of an angle of a triangle in terms of the sides, and easy questions on the solution of triangles dependent thereon; use of logarithmic and trigonometrical tables. Books of tables (to four places) will be supplied at the examination.

#### DRAWING.

The Syllabus in Drawing will be the First and Second Years' Syllabuses of the Department's Programme for Day Secondary Schools.

One of the following :—

AGRICULTURE.

HORTICULTURE.

FORESTRY.

DAIRYING AND CREAMERY MANAGEMENT.

Each applicant must have had substantial experience of practical work in connection with *either* farming, gardening, the management of woodlands, *or* dairying and creamery management. The examination may be written, oral, and practical. The subjects will include all the ordinary work of *either* farms, gardens, woods, *or* dairies as practised in Ireland. Under this head each applicant must present himself for examination only in the subject in which he desires a scholarship.

*N.B.—On no account will a scholarship be awarded to a candidate who fails to attain a high standard in the subject he selects for this portion of the examination.*

Marks will also be awarded on the ability of candidates to impart instruction as gauged by the style of the answers in both the written and the oral examinations.

Candidates who are qualified for scholarships by their examination on the foregoing subjects will be required to submit to an examination by a medical officer appointed by the Department. A scholarship will not be awarded in any case where the candidate is certified to be unfit to undertake the prescribed course of studies.

**LAST DATE FOR RECEIVING APPLICATIONS.**

**31st JULY, 1916.**

DEPARTMENT OF AGRICULTURE AND TECHNICAL  
INSTRUCTION FOR IRELAND.

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THE ALBERT AGRICULTURAL COLLEGE,  
GLASNEVIN, DUBLIN.

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SESSION 1916-1917.

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The Albert Agricultural College is situated on the north side of Dublin in a healthy situation about 170 ft. above the sea level. It is easily reached by tram to the Glasnevin terminus, from which it is distant less than a mile. The College consists of a residence for about sixty students, together with two farms, orchard, and gardens, all covering an area of about 400 acres.

The College provides courses of instruction—(a) for farmers, (b) for gardeners.

Two distinct courses of instruction for farmers are given—(1) an agricultural course which occupies in the Department's scheme of agricultural education a position intermediate between the instruction given at the Agricultural Stations and that provided by the agricultural faculty of the Royal College of Science, Dublin ;

(2) a course for farm apprentices. This course which is mainly practical in character is designed to afford young men who intend to become farmers in Ireland an opportunity for obtaining a useful training in the management of live stock and the field operations usual on good tillage farms.

The Horticultural Course is intended for selected pupils who are seeking to improve their technical and practical knowledge of fruit and vegetable growing, or to qualify for the post of Instructor in Horticulture. (For particulars relative to the Horticultural Course see separate leaflet, A. 158a.)

AGRICULTURAL COURSES.

(1) The ordinary College course is intended for young men who desire a technical and practical knowledge of agriculture, to fit them for entrance to the Royal College of Science, Dublin, for becoming farmers, or for engaging in any other occupation—such as creamery management—which requires technical training in the sciences underlying agriculture. It includes instruction in agriculture in the classroom, farmyard, and fields, supplemented by lessons in dairying, horticulture, poultry manage-

ment, bee-keeping, and veterinary hygiene. The elements of physics, chemistry, botany, zoology, and entomology are taught so far as is necessary to the proper understanding of the principles underlying the most approved farmyard practice.

Instruction is also given in book-keeping, surveying, and wood-work, while literature, mathematics, and drawing receive such attention as is found requisite.

Encouragement is given to the pursuit of athletics and to the development of social intercourse among the students.

The College discussion society meets frequently throughout the session. The papers read before it relate to topics of current interest to the farming community.

The library is supplied with standard works on agriculture, and copies of the best farming periodicals are procured regularly for students' use.

**The Staff.**—The staff consists of Principal, Agriculturist, House Masters, and teachers of chemistry, botany, zoology, veterinary hygiene, horticulture, dairying, poultry-keeping, bee-keeping, and woodwork. A competent Drill Instructor attends weekly to see to the physical training of the students.

The Clergy of the different denominations also visit the College weekly to give religious instruction. The domestic comfort and bodily health of the students are under the care of an experienced Matron.

**The Session.**—The course of study extends over a session of ten months, which for the year 1916-17 will open on Tuesday, the 10th October, 1916, and end on Friday, the 10th August, 1917. There will be two intervals, each of about a fortnight—during which students will return to their homes—one at Christmas and the other at Easter.

**College Certificate.**—The College certificate is awarded partly on the result of the sessional examinations, and partly on the work done throughout the year. It is of two classes, the first being reserved for those students who add to an intelligent grasp of scientific principles a high standard of skill in practical farm work.

**Conditions of Admission.**—Admission to the College is conditional on passing the entrance examination, furnishing evidence of good health and character, and paying the required fee. Only resident students who are prepared to stay the whole session and to take the full curriculum are admitted. They must not be less than 17 or more than 30 years of age on 1st September, 1916.

The entrance examination will be held in the first week in September, 1916, at four centres situated one in each province. Each applicant for admission will be notified in due course as to the centre at which he will be required to present himself. No expenses will be allowed in respect of attendance.

The subjects included in the examination will be as follows :—

- (1.) *English*, including dictation and composition.
- (2.) *Arithmetic*, including calculations requiring a thorough knowledge of weights and measures, decimal and vulgar fractions, percentages, and interest.
- (3.) *Mathematics*.—The elements of mensuration—lengths, areas, volumes; and algebra to simple equations.
- (4.) *Agriculture*.—The questions on this subject are framed with a view to testing knowledge acquired by practical experience of farm work. No text-book is prescribed or recommended. The examination may be oral as well as written.

**Fees.**—The fees for tuition, board, residence, laundry, and ordinary medical attendance during the entire session are :—

For students whose parents or guardians derive their means of living mainly from farming in Ireland, £15  
 For students other than the foregoing, . . . £50

The fees are payable to the Principal in two instalments, viz., one of £10 (or £30) on entrance and the balance on 1st February. In addition to the instalment of the fee payable on entrance each student must deposit with the Principal a sum of £3 to cover the cost of repairs to clothing, and of books and stationery. The unexpended balance, if any, of this deposit will be returned at the close of the session.

**Free Places.**—Several County Committees of Agriculture make provision for scholarships tenable at the Albert Agricultural College. These scholarships are offered for competition amongst the best students attending the courses which are held each winter under the Department's scheme of Agricultural Classes.

**Outfit.**—Students are required to provide themselves with a proper outfit, particulars of which will be supplied to candidates successful at the entrance examination.

**Application for Admission.**—Application must be made on the prescribed form, to be obtained from—

THE DEPARTMENT OF AGRICULTURE AND  
 TECHNICAL INSTRUCTION FOR IRELAND,  
 UPPER MERRION STREET,  
 DUBLIN.

Applications will be dealt with in the order of their receipt in the Department's Offices. They should be forwarded not later than the 14th August, 1916.

**Scholarships open to Past Students.**—Several scholarships in agriculture tenable at the Royal College of Science, Dublin, are offered annually by the Department for competition among young Irish farmers. These scholarships are intended to enable students to become qualified for appointment to county



instructorships in agriculture, teacherships in agricultural schools, and other similar positions. Each scholarship includes free admission to the full four-years' course of training at the Royal College of Science, together with provision for the student's board and residence while in attendance at the College. The ordinary course at the Albert Agricultural College provides a suitable training for students who desire to compete for these scholarships.

## (2) COURSE FOR FARM APPRENTICES.

A limited number of young men will be admitted as farm apprentices for a course of practical training on the College farms. Applicants must be at least 17 years of age on the 1st October, 1916, and must satisfy the Principal of the College as to their intelligence and their fitness for, and willingness to do and learn, farm work.

The period of training will be about twelve months. There will be an interval of one week during which the apprentices may return to their homes.

An apprentice who is found to be unable to perform a fair day's work or to be otherwise unsuitable will not be retained.

Apprentices will be admitted without payment of fee. They will be required to deposit with the Principal on entrance a sum of £1 to cover the cost of repairs to their clothing, and the purchase of such books, etc., as may be required by them. The balance, if any, of this deposit will be refunded at the termination of the course.

Apprentices must keep such hours as the work of the farm, including care of live stock, necessitates. They will be free on Saturday afternoons, except during seed-time, hay-time, harvest, or other periods of pressure.

Apprentices will reside in the buildings attached to the College and will be subject to the regulations applying to other students except that they will not be required to attend daily instruction in the class-rooms. Separate classes, in the evenings and at times when farm work is not pressing, will be formed for them.

Apprentices must provide themselves with a proper outfit, particulars of which will be supplied to selected applicants.

Applications for admission should be addressed to :—

THE SECRETARY,  
DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET,  
DUBLIN.

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*A booklet descriptive of the College, and containing detailed syllabuses of the courses in the several subjects of the curriculum, may be obtained on application as above.*

Form A. 178 (a).  
1916.

Department of Agriculture and Technical  
Instruction for Ireland.

AGRICULTURAL EDUCATION FOR YOUNG MEN.  
Session 1916-1917.

FARM APPRENTICESHIPS.

AGRICULTURAL STATION, ATHENRY, CO. GALWAY.

Young men who intend to become farmers in Ireland are admitted to the Station for one year, as apprentices, for a course of practical training in several branches of farming. Instruction in the principles of the sciences underlying ordinary farm practice is also provided.

Apprentices are admitted without payment of any fee. They are required to take part in all the operations of the fields and of the farm-yard. They must perform diligently all work assigned to them by the Farm Manager or his foreman. Applicants are not admitted unless they are regarded as generally fitted to discharge the duties of an apprentice.

Technical instruction in the class-room is included in the course. During the spring and summer months such instruction is given only at times when the weather is unsuitable for outdoor work. The class-room instruction is of such a character as to continue the general education of the apprentices and be useful to them in their future career as farmers. It is not intended as a preparation for any examination.

Applicants for apprenticeships must be not less than seventeen years of age on the date of admission. Preference is given to those applicants who produce evidence that they have sure prospects of obtaining farms of their own, or *bona fide* employment at farming. If, in addition, such applicants have attended a course of instruction under the Department's Scheme of Winter Agricultural Classes, they are allowed priority in order of admission to the Station. It is also a recommendation if the applicant has attended a course of instruction held under the Department's Scheme of Winter Agricultural Classes, or if he produces a certificate from an Itinerant Instructor in Agriculture that he has taken advantage of the Instructor's lectures and demonstrations and has shown a desire to improve his knowledge of tillage farming.

The apprentices are required to reside in the buildings attached to the Agricultural Station, where they are under the immediate supervision of the Superintendent.

Admission as an apprentice is conditional on producing certificates of good health and character.

The course of study will extend from the 17th October, 1916, to the 12th October, 1917. There will be an interval of about a week at Christmas, during which the apprentices may return to their homes.

Subject to passing a qualifying examination, to test their fitness from an educational point of view to take advantage of the course at the Station, and satisfying the Department that they are physically equal to the farm work of the Station, apprentices are admitted in the order of the receipt of their applications in the Department's offices. The Department do not guarantee admission to any applicant. An apprentice is not retained at the Station if he is found unable to perform a fair day's work or to be otherwise unsuitable.

### *Scholarships.*

The Committees of Agriculture for Counties Cork, Kerry, Kilkenny, Leitrim, Limerick, Roscommon, Sligo, Tipperary (N.R.), Tipperary (S.R.), and Westmeath have made provision for scholarships tenable at an agricultural school during the 1916-17 Session. These scholarships will be offered for competition among the best students attending the Winter Agricultural Classes during the 1915-16 Session. Each successful competitor will be given the option, subject to certain conditions, of taking out his scholarship at Athenry or Clonakilty Agricultural School.

### *Outfit.*

Apprentices are required to provide themselves with a proper outfit, particulars of which are supplied to applicants when they are being notified of their admission.

A sum of £1 must be deposited with the Superintendent on entrance to cover the cost of repairs to clothes, the purchase of books, stationery, etc. The unexpended balance, if any, of this deposit is refunded on the termination of the apprenticeship.

### *Applications for Admission.*

Application for admission must be made on the prescribed form, to be obtained from—

THE DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET,  
DUBLIN.

Latest date for making application for admission to the 1916-17 Session—11th September, 1916.

DEPARTMENT OF AGRICULTURE AND TECHNICAL  
INSTRUCTION FOR IRELAND.AGRICULTURAL EDUCATION FOR YOUNG MEN.  
Session 1916-17.

## FARM APPRENTICESHIPS.

AGRICULTURAL SCHOOL, CLONAKILTY, COUNTY  
CORK.

Young men who intend to follow the farming profession in Ireland, and who desire to acquire a practical knowledge of its several branches, are admitted to the School as apprentices.

The farm is managed by an experienced agriculturist, under whose direction the apprentices are required to take part in all the work of the fields and of the farmyard, whether in connection with seasonal operations or permanent improvements. In the class-room attention is given, in the evenings and at other times when outdoor work is not pressing, to English, Arithmetic (including Surveying), Book-keeping and Technical Agriculture. This instruction is not intended as a preparation for any examination. It is of such a character as to continue the general education of the apprentices, and be useful to them in their future career as farmers.

Applicants for apprenticeships must be not less than seventeen years of age on the 1st October, 1916. Preference is given to those applicants who produce evidence that they have sure prospects of obtaining farms of their own, or *bona fide* employment at farming. If, in addition, such applicants have attended a course of instruction under the Department's Scheme of Winter Agricultural Classes they are allowed priority in order of admission to the School. It is also a recommendation if the applicant produces a certificate from the Itinerant Instructor in Agriculture for the County in which he resides that he has taken advantage of the Instructor's lectures and demonstrations and has shown a desire to improve his knowledge of tillage farming.

The apprentices are required to reside in the buildings attached to the School, where they are in the charge of a house master and matron.

The 1916-17 Session will commence on the 10th October, 1916, and will terminate on the 10th August, 1917. There will be two intervals, each of about a fortnight, during which the apprentices may return to their homes—one at Christmas and the other at Easter.

Admission as an apprentice is conditional on passing the entrance examination, producing certificates of good health and character and paying the required fee according to the scale indicated overleaf.

Applicants who have been pupils at Winter Agricultural Classes are exempted from the entrance examination, provided their attendance and progress at the Agricultural Classes have been satisfactory.

An apprentice is not retained at the School if he is found to be unable to perform a fair day's work, or to be otherwise unsuitable.

Students will be admitted on probation as the result of an examination which will be held in Dublin on the 4th August, 1916. The subjects included in the examination will be :—

- (1.) English—to be tested by dictation and a short letter.
- (2.) Arithmetic—the first four rules, simple and compound ; a knowledge of weights and measures ; and percentages.
- (3.) Practical Fruit-growing and Gardening.

A high standard will not be expected in English or Arithmetic. The examination in practical fruit-growing and gardening will cover the whole range of these subjects.

No expenses will be allowed to candidates in connection with their attendance at this examination.

Successful candidates will be required to enter on their duties on the 10th October, 1916.

The session will close on the 30th September, 1917. Students may be retained at the School beyond that date, if, in the opinion of the Department, they would profit by an extension of the course.

Students are provided with furnished lodging, including coal and light, and receive an allowance of 14s. per week. They are required to find their own board.

Students of the Horticultural School are subject to such regulations regarding conditions of work, hours of attendance, etc., as may be made from time to time by the Department.

The Department do not undertake to employ or to procure employment for students at the close of the courses, but the names of those who qualify are sent to County Committees of Agriculture with an intimation that they are eligible for appointment by such Committees to instructorships under the Department's Scheme of Instruction in Horticulture and Bee-Keeping.

Several men who have passed through the School are now employed by County Committees of Agriculture.

Application to attend the examination must be made on the prescribed form, to be obtained from

THE DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET, DUBLIN.

Last date for making application—11th July, 1916.

DEPARTMENT OF AGRICULTURE AND TECHNICAL  
INSTRUCTION FOR IRELAND.FORESTRY INSTRUCTION.

A limited number of apprenticeships in Forestry will be awarded on the result of an examination which will be held in Dublin on the 7th September, 1916.

Applicants for apprenticeships must be not less than eighteen years of age and not more than twenty-five years on the 1st October, 1916. They should be in good health, and of strong constitution, and have received a fair general education. Preference will be given to those applicants who have had experience of work in woods.

The subjects included in the examination will be—

English—to be tested by dictation and a short letter.

Arithmetic—the first four rules, simple and compound; a knowledge of weights and measures, proportion, percentages, and of the elements of the mensuration of lengths, areas and volumes.

No expenses will be allowed to candidates in connection with their attendance at this examination.

The successful candidates will be required to work, under the directions of a skilled foreman, at Forestry Centres belonging to the Department. The period of employment at any Forestry Centre will be determined by the Department, and will not exceed two years.

Apprentices will be required to enter on their duties on the 2nd October, 1916.

Each apprentice will receive an allowance at the rate of 14s. per week, with furnished lodging. When in receipt of this allowance the apprentices will be required to find their own board.

Apprentices must undertake to conform with the rules and regulations made from time to time in connection with their work at the Forestry Centre to which they are assigned.

The engagement between apprentices and the Department may be determined at any time by one week's notice on either side.

The Department do not undertake to employ or to procure employment for apprentices on completion of their training.

Applications for apprenticeships must be made on the prescribed forms to be obtained from—

THE DEPARTMENT OF AGRICULTURE  
AND TECHNICAL INSTRUCTION,

UPPER MERRION STREET,

DUBLIN.

## Scheme No. 15 (Revised 1916.)

DEPARTMENT OF AGRICULTURE AND TECHNICAL  
INSTRUCTION FOR IRELAND.SCHEME FOR ENCOURAGING IMPROVEMENT IN THE  
MANAGEMENT OF CREAMERIES, SEPARATING  
STATIONS AND CHEESE FACTORIES.

## GENERAL REGULATIONS.

1. The object of this scheme is to encourage improvement in the manufacture and marketing of dairy produce by providing facilities for obtaining advice on technical and business methods affecting the management of creameries, separating stations and cheese factories.

2. To effect the object of the scheme the Department undertake :—

(a) To provide the services of instructors in dairying, free of charge.

(b) To make provision during the winter for a course of instruction in technical subjects with special reference to the manufacture and marketing of dairy produce.

(c) To provide teachers for local short courses of instruction to managers, butter-makers, and other persons employed at creameries, etc.

(d) To encourage the holding of surprise butter inspections by local associations of creameries.

(e) To arrange for the training of butter-makers and cheese-makers.

(f) To award certificates of competency in creamery management, butter-making and cheese-making.

(g) To assist those creameries and cheese factories producing a uniform article of good quality in finding better markets for their produce.

(h) To conduct experiments on points requiring investigation, and to give demonstrations of improved methods of manufacturing dairy produce.

3. For the purpose of this scheme—

(a) The term “creamery” shall mean premises adapted and utilised for the manufacture of butter from cream which has been separated from milk by means of centrifugal force applied by mechanical power. Provided that the premises are not, and do not require to be, registered under the Sale of Food and Drugs Acts, 1875 to 1907, and that in the ordinary course of the business on every day on which milk or cream is treated at the premises the quantity so dealt with is sufficient to make at least 56 lb. of butter.

(b) The term “separating station” shall mean any premises adapted and utilised for the separation of cream from milk by means of centrifugal force applied by mechanical power but not utilised for the manufacture of butter. Provided that the premises are not, and do not require to be, registered under the Sale of Food and Drugs Acts, 1875 to 1907, and that in the ordinary course of

premises the quantity so dealt with is sufficient to make at least 28 lb. of butter.

(c) The term "creamery butter" shall mean butter which has not been blended nor re-worked, and which has been made in a creamery from cream separated from milk by centrifugal force applied by mechanical power.

4. Any creamery, separating station, or cheese factory, from which application (on Form A. 175, signed by the proprietor or by the president or chairman of the society or company owning the creamery, separating station or cheese factory, as the case may be, and by the manager thereof) is duly received and accepted by the Department, will be inserted on the list of creameries, separating stations, and cheese factories which are visited by the Department's instructors in dairying. Provided that a creamery at which cream or milk is received from one or more separating stations which are under the control of the proprietors of the creamery will not be entered or retained on the list in question unless all the separating stations referred to are at the same time entered or retained on the list, and that a separating station under the control of the proprietors of a creamery will not be entered or retained on the list in question unless the creamery is also on the list for visits.

On the occasion of each ordinary visit, all necessary advice will be afforded on matters relating to creamery management, and a report embodying the instructors observations on the condition and working of the creamery, separating station, or cheese factory visited may be entered in a report book to be supplied by the Department, and to be carefully preserved at the creamery, separating station, or cheese factory, as the case may be, and produced for the inspection of the Department's officers when so required. Supplementary reports will be furnished, as may be thought fit, in special circumstances, *e.g.*, when suggestions for machinery and sketch-plans or notes for alterations in buildings are required, or when methods of manufacture or marketing call for such reports.

5. A creamery, separating station, or cheese factory from which application on Form A 175 is accepted will be visited by the Department's instructors until notification is given to the contrary on either side. A creamery, separating station, or cheese factory on the list of those receiving visits from the instructors at the date of publication of this scheme will be considered as entered for visits under the scheme, unless notification to the contrary is received.

6. Applications (on Form A 174, signed by the proprietor or by the president or chairman of the society or company owning the creamery, separating station or cheese factory, as the case may be or by the manager thereof) may be made for special visits of the instructors for certain purposes, *e.g.*, the preparation of sketch-plans and notes for the construction or alteration of buildings, or suggestions for machinery.

Applications for special visits may be made by the proprietors of creameries, separating stations, or cheese factories not included in the list of those visited by the instructors under Clause 4 of this scheme. The requirements of creameries, separating stations, and cheese factories on the list for regular visits will, however, receive prior consideration.

7. The premises and equipment and the manufacturing opera-



tions and business methods of creameries, separating stations and cheese factories entered on the list of those visited by the Department's instructors must be open at all reasonable times to inspection by the Department.

8. The Department may, without assigning any reason, refuse to send an instructor to any creamery, separating station or cheese factory.

#### CERTIFICATES IN CREAMERY MANAGEMENT.

9. An examination will be held annually in March in technical subjects as applied to creamery management, and a certificate of having passed the examination will be awarded to successful candidates. A syllabus of the subjects of the examination may be obtained on application to the Department.

Application for admission to the examination should be made on Form A 137, to be obtained from the Department, and must be accompanied by a deposit of £1, which will be returned if the candidate presents himself for examination, or if his application is not accepted.

10. On application to the Department, a manager of a creamery, who holds the certificate referred to in Clause 9, and who satisfies the Department as to his practical ability to manage a creamery, will be awarded a further certificate designated the "CREAMERY MANAGER'S CERTIFICATE."

#### TRAINING OF CREAMERY MANAGERS.

11. During the winter a course of instruction in the subjects of the examination referred to in Clause 9 will be provided. This course will occupy five months approximately, commencing in October and terminating in March. Particulars of this course are issued in a separate leaflet (Form A 134 (a)), copies of which may be had on application to the Department. At the close of this course a limited number of the best students will be afforded facilities for learning the practice of creamery management during the summer in selected creameries. Such students will, in addition to free instruction, receive a maintenance allowance at the rate of ten shillings per week, while in attendance at the creamery.

Candidates for the course are advised to attend, as a preliminary training, a course at an agricultural station or at the Albert Agricultural College, Glasnevin, and to spend a season in a well-equipped and well-managed creamery.

#### TRAINING OF DAIRYMAIDS.

12. Girls who desire to become dairymaids in creameries, and who have attended two terms either at the Munster Institute or the Ulster Dairy School will, on attaining the required standard at their second terminal examination, be admitted to the third term course at the Munster Institute or Ulster Dairy School. On completion of this course a limited number of these pupils will be afforded facilities for learning the practical work of a dairymaid in selected creameries in Ireland. In selecting the pupils to whom these facilities will be offered, regard will be had to (1) their knowledge of dairying as evidenced by their answering at the terminal examination at the conclusion of their course of instruction as third-term students, and (2) their physical suitability for the work

of a dairymaid in a creamery. Each selected pupil will receive a maintenance allowance at the rate of ten shillings per week in addition to free instruction at a creamery for a period of twenty weeks. A pupil who has had a season's experience of the work of a dairymaid at a creamery or who has attended for one term at a school of rural domestic economy before entering the Munster Institute or the Ulster Dairy School will be regarded as eligible for a course of training as pupil dairymaid after two terms at the Munster Institute or the Ulster Dairy School provided she attains the required standard and is regarded as physically suitable for the work. A certificate of competency as a creamery butter-maker will be awarded at the conclusion of the training, provided the work of the pupil has been satisfactory.

#### TRAINING OF CHEESE-MAKERS.

13. The Department may provide courses of instruction in cheese-making at a suitable cheese factory. The training will include instruction in the manufacture, packing and sale of cheese.

A candidate for this training must be either a trained dairymaid or a student who has passed satisfactorily through the Department's course of instruction in creamery management.

A certificate of competency will be awarded, provided the work of the student has been satisfactory.

#### SHORT COURSES OF INSTRUCTION.

14. The Department are prepared, as far as circumstances will permit, to give the services of teachers to conduct during the winter months a limited number of short courses of instruction for managers, butter-makers and other persons employed in creameries, etc.

#### LOCAL SURPRISE BUTTER INSPECTIONS.

15. The Department are prepared to give the services of the instructors to assist in the holding of local surprise butter inspections, and to act occasionally as judges, if so desired.

Creamery proprietors and managers desirous of establishing a system of local surprise butter inspections in any district in Ireland should first ascertain the number of creameries from which butter would be regularly sent to the local inspections. A local association representative of the proprietors and managers of those creameries should then be formed, and a secretary should be appointed. The duties of the secretary should be to conduct all correspondence and business in connection with the local inspections, subject to such regulations as the local associations may prescribe, with the approval of the Department. The Department will be prepared to consider an application from a duly constituted association of this kind for a grant towards the expenses of holding local surprise butter inspections.

The grant to be made by the Department will be subject to the following conditions:—

- (1) That a sufficient number of creameries participate regularly in the inspections.
- (2) That all the regulations made by the local association are approved by the Department.

- (3) That a proportion of the cost of the inspections is contributed by the proprietors of participating creameries.
- (4) That the local association accepts complete responsibility for the proper carrying out of the inspections.
- (5) That the inspections are carried out strictly in accordance with the regulations as prescribed by the local association and approved by the Department.

#### MARKETING OF DAIRY PRODUCE.

16. The Department will endeavour to assist creameries and cheese factories in finding markets for their dairy products, provided that they are satisfied that the produce is uniform and of good quality, and that it is placed on the markets in packages so marked that the manufacturer may be identified.

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### DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

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#### COPPER SULPHATE FOR THE SPRAYING OF THE POTATO CROP.

The Department have been in communication with the principal manufacturers and distributors and with the Board of Trade regarding the supplies of Copper Sulphate required for the spraying of the potato crop during the coming season.

It appears that owing to the demands of the Ministry of Munitions of War for sulphuric acid, the manufacture of Sulphate of Copper in the United Kingdom has been considerably curtailed and a shortage of production of this article has resulted. The issue of export licenses for sulphate of copper has consequently been temporarily suspended, but the Department are informed that the licensing of exports to allied countries whose agricultural prosperity depends upon receiving supplies from the United Kingdom cannot now be much longer deferred. The following is an extract on this subject from a letter marked "pressing" recently received by the Department from the Board of Trade :—

"With reference to your letter (A. 4538-16) of the 26th February respecting the quantity of Sulphate of Copper required in Ireland for agricultural purposes during the coming season, I am directed by the Board of Trade to state that, in view of the increasing and insistent demands which are being made by Foreign Governments for supplies of this commodity, it would seem advisable for Irish farmers to acquire such stocks as will be requisite for their needs at the earliest possible date."

The Board of Trade further state that in these circumstances it would appear advisable for Irish traders who stock spraying materials, as well as for Irish potato growers,

"to make their purchases at once and not to defer doing so until the product is required for use. There is no apparent likelihood of the present prices being reduced; possibly they may undergo further increase."

The value of spraying in preventing disease and ensuring a satisfactory crop was never so evident as during last season. Growers should on no account neglect to spray their potato crop, even though the price of spraying materials is considerably enhanced.

The Department would, therefore, urge farmers to give their orders as soon as possible, so as to facilitate dealers in providing sufficient stocks.

*March, 1916.*

A. 122 (S).

## DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

### TRAINING OF WOMEN FOR FARM WORK.

To provide training for young women who desire to undertake farm work with the object of releasing men to join the Army for war service, the Department have arranged for a course of practical instruction at the Munster Institute, Cork. There will be a probationary course of four weeks, after which those who show an adaptability to this class of work will be given a further short period of instruction to enable them to become efficient.

To be eligible for this course of training, young women must be over twenty years of age, healthy, and willing to take part in any class of work on the land, in the farmyard, poultry runs, dairy, and garden at such hours as the seasonal work renders necessary.

Each selected applicant will be required to provide herself with a suitable outfit, particulars of which will be furnished.

The fee for tuition, board, residence, laundry, and ordinary medical attendance will be 10s. 6d. per week for persons of Irish birth.

Forms of application for admission to the course may be obtained on application to

THE SECRETARY,  
DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET,  
DUBLIN.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET, DUBLIN,  
*29th January, 1916.*

No. A. 1054—16.

### CULTIVATION OF LABOURERS' PLOTS.

SIR,

I have to state, for the information of the Rural District Council, that the Department have under consideration in connection with their campaign for the promotion of an increase in the production of home-grown food, the question of the cultivation of plots provided out of public funds for agricultural labourers. It is understood that in numerous cases such plots are very inadequately utilised,

although it appears that the Regulations governing their tenancy generally provide that at least one-half of each plot shall be properly cultivated each year. In view of the large number of the plots created in the country, their proper utilisation is a matter of very considerable importance at the present time when increased production of home-grown food is vital to the national economy, especially, having regard to the necessity for reducing the nation's indebtedness to foreign countries.

The Department, therefore, desire to draw the attention of Rural District Councils to their serious responsibilities in this matter and would suggest that active steps should at once be taken to secure that the Regulations under which occupiers are required to cultivate their plots shall be fully enforced in every case where culpable neglect is apparent. In this connection it is advisable that Councils should at once remind holders of plots provided under the Labourers' Acts of their obligations, and of the desirability of their cultivating the whole of their plots if possible.

The services of the County Instructor in Horticulture to advise as to the management of plots can be obtained on application to the Secretary of the County Committee of Agriculture for the county concerned.

Much useful information can also be obtained from the Department's booklet on the "Management of a Cottage Garden" (copy enclosed), which can be purchased from Messrs. E. Ponsonby & Co., 116 Grafton Street, Dublin, for 1d. (by post, 1½d.). It is suggested that Councils should bring this booklet to the notice of ploholders.

I am,

Sir,

Your obedient servant,

T. P. GILL,

*Secretary.*

The Clerk of each Rural District Council.

## DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

### TESTING OF FLAX SEED, 1916.

Owing to the greatly increased demand for sowing Flax Seed this season, there may be placed on the market a considerable quantity of seed which, though in appearance of good quality, may be inferior in germinating power. A quantity of Flax Seed was harvested in Ireland last season. Some of this seed may not have been properly saved or may have deteriorated in keeping. It is well recognised that Irish seed when separated from the bolls and stored in bags is liable to lose its germinating power.

In view of these circumstances, the Department would again remind farmers that it is most essential, if disappointment from unsatisfactory brairds is to be avoided, that samples of all Flax Seed which is not of assured quality should be tested for germination and purity. In cases where the germination of a sample is found to be relatively low, a braird of normal thickness may be secured by sowing a proportionately greater quantity of seed.

Farmers can have seed tested at the Seed Testing Station for Ireland at the nominal charge of 3d. per sample. In order to admit

of tests being carried out and the results furnished before sowing time, samples should be forwarded *at once*. A table showing the rates of sowing the seed according to its germination is supplied with the result of each test. Special envelopes for forwarding samples for testing may be had free of charge on application to "The Secretary, Department of Agriculture and Technical Instruction for Ireland, 4 Upper Merrion Street, Dublin." Letters of application so addressed need not be stamped.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET, DUBLIN,  
6th April, 1916.

No. G. 2377/15.

### NEED FOR INCREASED TURF-CUTTING THIS SEASON.

SIR,

The Department consider that it would be of great advantage if County Committees of Agriculture and Technical Instruction through their members and officials would again this year direct the attention of owners of bogs and of all engaged in the work of cutting turf to the importance of seeing that special efforts are made during the coming season to secure an increased output of this fuel.

Until some decisive alteration occurs in the conditions prevailing at the moment, there seems no likelihood of a reduction in the present cost of coal. Should this view be correct, and the Department believe that it is, there will certainly be a greatly increased need and demand for turf as fuel. It is to the interest of all concerned to see that steps are now taken to meet that need. If a sufficient quantity of turf is not cut and saved this season, the Department fear that there is likely to be very serious hardship in many districts, more especially in those places far from ports or large centres where the price of coal is comparatively high at all times and is almost prohibitive to the poorer classes of the population at present.

As regards the actual work of manufacturing the fuel, the Department recommend that the existing well-known methods of cutting by hand be adhered to. So far, it has been found much cheaper to manufacture peat fuel for domestic use in Ireland by hand than by machinery.

If the cutting of turf on any largely increased scale is to be secured this season it is necessary that the vital importance of the matter be brought to the notice of all concerned without delay. The Department therefore request that you will take an early opportunity of laying this letter before your Committee for such action as they may consider necessary.

I am,

Sir,

Your obedient Servant,

T. P. GILL,

*Secretary.*

The Secretary  
of each County Committee.

## II.—TECHNICAL INSTRUCTION.

DEPARTMENT OF AGRICULTURE  
AND TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET,  
DUBLIN, *February, 1916.*

No. T. 1364-16.

SIR, OR MADAM,

Adverting to my recent Circular Letter, No. T. 12731-15, relative to the suspension of certain of the Department's operations in consequence of the financial considerations imposed upon them in connection with the War, I have to state that the Department have been in communication with the Lords Commissioners of His Majesty's Treasury upon the subject, and have now received their Lordships' sanction to the continued operation of Section III, of the Programme for Technical Schools and Classes. Classes which have already been accepted under the terms of this Section will consequently continue to be recognised for grants for the full period notified to the Department at the beginning of the session.

Their Lordships have also sanctioned the continuance of Summer Courses of Instruction for Teachers during the forthcoming vacation. Particulars of the courses to be held will be issued shortly. Applications for admission to these courses must be submitted by the 31st March upon forms of which copies will be supplied by the Department, upon application, after the 1st proximo.

Provided that a sufficient number of candidates intimate their intention to present themselves for examination, the Department will arrange for an examination in the Principles, Methods, and History of Education, with special reference to Science Teaching, to be held on the 24th June, and a Special Examination for Teachers' Qualifications in Manual Training (Woodwork), on the 13th and 14th June. Forms of application for admission to these examinations will be supplied by the Department, upon application, after the 1st proximo.

I am,

Sir or Madam,

Your obedient Servant,

T. P. GILL,

*Secretary.*

Form S. 41.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET, DUBLIN.

### SUMMER COURSES OF INSTRUCTION FOR TEACHERS, 1916.

The Summer Courses of Instruction for Teachers to be conducted by the Department during the present year, and of which details are given below, will, with the exception of the course of instruction in Rural Science (including School Gardening) for National School Teachers, begin on Tuesday, 4th July, and close on Friday, 28th July. The course in Rural Science (including School Gardening)

will begin on Tuesday, 8th August, and close on Friday, 1st September.

A course in any subject will not be arranged for unless a sufficient number of satisfactory applications are received.

Should the applications for any course exceed the number for which it is proposed to provide accommodation, those applicants will be selected whose admission would appear most likely to prove beneficial. Teachers who have attended Summer Courses of instruction in previous years, and who have been giving instruction in the subjects of those courses during the present session, will have priority of claim for admission to advanced courses.

It is important that teachers should not apply unless they know that they will be able to attend, for much inconvenience, as well as injustice to others, may be entailed by the applicants failing to take advantage of admission which may be offered. Failure to attend the course after the invitation has been accepted, will, except in the case of illness, be regarded as an abuse of the privilege; and any teacher failing in this respect will not be admitted to any future course.

Teachers who attend the courses regularly and punctually at the prescribed hours will be allowed a sum of £3 10s. towards their expenses while living at the centre, and Third Class Railway Fare for one return journey from the railway station nearest their school or centre. No allowance for travelling will, however, be made unless the station is more than twenty miles distant from the centre to which a teacher is assigned. Return tickets must be taken whenever a saving can be effected thereby, and only the fare by the cheapest route will be allowed. No car fares, or other expenses, other than Railway Fares, will be refunded.

Teachers attending courses conducted at the Irish Training School of Domestic Economy may be required to reside at the School, and in that case only the allowance in respect of travelling, as above, will be made.

Teachers may not absent themselves from their classes without leave, in writing, from the Department. *Leave of absence will be granted only in exceptional circumstances.* Teachers who absent themselves without having secured the Department's leave will be liable to suspension and forfeiture of the grant towards their travelling and maintenance expenses.

Teachers who may be prevented by sickness from attending their classes should immediately notify the Instructor-in-charge. If such absence extends over more than two days a certificate of a duly qualified medical practitioner, stating the cause of absence, must be furnished.

The hours of attendance for the courses held during the month of July will be from 9.15 a.m. to 3.15 p.m. daily (with an interval from 12 noon to 1 p.m. for luncheon), except on Saturdays, when the hours of attendance will be from 9.15 to 12.15 p.m. Teachers attending the course in Rural Science (including School Gardening) will be required to attend from 9.15 a.m. to 3.30 p.m. daily (with an interval from 12 noon to 1 p.m. for luncheon), except on Saturdays, when the hours of attendance will be from 9.15 a.m. to 12.30 p.m.: the classes in this subject will not meet on Tuesday, 15th August. All teachers attending the courses will also be required in the evening to write out notes, etc.



Teachers desiring to take advantage of these courses must fill up and return the appropriate form of application (*see below*) as early as convenient, but in any case so as to reach the Offices of the Department not later than the *31st March*.

N.B.—These courses are open only to those who are over twenty years of age, and, except in certain cases specified below, only to teachers who are engaged (*a*) by local Committees of Technical Instruction; or (*b*) in Schools receiving grants either directly from the Department or under the provisions of an approved local Scheme of Technical Instruction.

## DETAILS OF THE COURSES.

### I.—WATER FOR INDUSTRIAL PURPOSES.

This course is intended mainly for teachers of Chemistry in Technical Schools. Applicants for admission to the course should hold a University Degree in Chemistry, or equivalent qualifications.

The course will deal with the constituents of natural waters and their suitability for industrial purposes—their analysis and treatment and their bearing on Public Health. Sources of Supply. Composition of waters from various geological formations—of river waters, and of land drainage waters. Classification of waters, from the mineral standpoint and from the standpoint of organic impurity, for industrial purposes. The bio-chemical purification of dissolved organic impurities in waters, under natural conditions. Nitrification. The two great classes of water bacteria concerned in the purification of the dissolved organic impurities in waters—their unique mode of nutrition. The fundamental influence of dissolved oxygen upon the bio-chemical purification of dissolved organic impurities in waters. The practical examination of waters: the estimation of organic, albuminoid, ammoniacal, nitrous and nitric nitrogen; the absorption of oxygen from acid permanganate, and from acid bichromate; total solid matter; chlorine as chlorides; sulphates; carbonates; calcium and magnesium. Temporary and permanent hardness. The dissolved gases. Microscopic examination of sediments. The examination of muds and sands for organic impurities. The purification of trade waste liquors and effluents.

Application for admission to this course must be made on Form S. 305.

### II.—PRACTICAL ELECTRICAL TESTING AND MEASUREMENTS.

This course is intended for teachers of Electro-Technology and Physics in Technical Schools and teachers of the Special Course in Physics for Day Secondary Schools. The course of instruction will include:—The construction, testing, maintenance and care of storage cells. Measurement of current and E.M.F. by galvanometers, ammeters, voltmeters, and other measuring instruments. Measurement of resistance and conductivity. Measurement of power. The electromagnet and its practical applications. The investigation of the magnetic properties of iron and its alloys. The measurement of self and mutual induction. Capacity and its measurement. Cable testing, and the localisation of faults in “dead” and “live” cables. The elementary principles of

alternating currents. Construction and use of alternating current ammeters, voltmeters and wattmeters.

Application for admission to this course must be made on Form S. 305.

### III.—INTERNAL COMBUSTION ENGINES AND MOTOR CAR.

This course is intended for teachers of Mechanical Engineering in Technical Schools. The course will include a series of lectures on the working, efficiency, and design of gas, petroleum, Diesel, and motor car engines and mechanism. Experimental work will be undertaken to determine the most economical conditions of working; the effect on power and economy of dilution of charge and alternation of timing, which will involve the measurement of Indicated Horse Power, Brake Horse Power, and the calorific power and consumption of fuels. The work in Design will include making the necessary drawings and calculations to determine the size of cylinders to develop a given horse power; stresses in crank shaft; size of bearings; efficiency of gear wheels; design of gear box and balancing of motor car engines; lubrication; transmission system; carburettor design; ignition system.

Application for admission to this course must be made on Form S. 305.

### IV.—TECHNOLOGY FOR TEACHERS OF INTRODUCTORY ENGLISH AND MATHEMATICS IN TECHNICAL SCHOOLS.

The object of this course is to indicate to teachers of Introductory Courses in Technical Schools the character of the specialised instruction which their students are likely to take up in succeeding sessions. It is intended to enable teachers to make their instruction more truly preparatory to a Specialised Course.

The instruction given will include lectures on the technology of materials, and the sources, manufacture, and general properties of selected materials, such as coal, iron, lead, copper, alloys, woods, building stones, leather, etc. Lectures will be given on the steam engine and on some workshop processes. Instruction will also be given in Mechanical Drawing. Opportunities will be afforded for the making of dimensioned hand sketches and of plans and elevations. Exercises in Practical Geometry, such as the development of simple surfaces, will be carried out. The course will further provide instruction in Workshop Mathematics of a practical type.

Application for admission to this course must be made on Form S. 305

### V.—COMMERCIAL ARITHMETIC AND ECONOMIC GEOGRAPHY.

Two courses as above will run conjointly, that is, will be given to the same group of teacher-students. The courses are intended for teachers of elementary Commercial subjects in Technical Schools and preference will be given to those applicants who are at present giving instruction in either of the subjects mentioned.

The course in Commercial Arithmetic will be designed to cover the subject matter, and methods of presentation in class, of those parts of Arithmetic which are of special interest and service to students in Technical Schools who are about to enter, or have entered, upon Commercial occupations.

The course in Economic Geography will be based on Ireland as a region—

- (1) The first part of the course will comprise a study of the physical and climatic phenomena of the region and the influence of these phenomena on the economic and social life of the inhabitants; a study of Ireland's trade with other countries and considerations arising therefrom.
- (2) The second part of the course will deal with the relations of the subject to the institutions of local government in Ireland.

Application for admission to these courses must be made on Form S. 305.

#### VI.—PRACTICAL MATHEMATICS AND MECHANICS.

Elementary and advanced courses will be held. These courses are intended for teachers of Building Trades and Engineering subjects in Technical Schools, and for the further training of Manual Instructors who have attended the special training courses conducted by the Department.

Application for admission to these courses must be made on Form S. 147.

#### VII.—FURNITURE DESIGN.

This course is intended for teachers of Cabinet-making and Woodwork. The instruction will include general principles of design in furniture and interior woodwork and accessory fixtures; the influence of material and fundamental constructions; enrichment by carving, inlay, painting and metalwork. The study of historic examples as precedents to original design will form an important feature of the work. Drawings and Designs will be made, to scale and full size, for workshop requirements.

Application for admission to the course must be made on Form S. 147.

#### VIII.—LIFE DRAWING AND FIGURE COMPOSITION.

This course is intended for teachers in Schools of Art and Art Classes in Technical Schools. If there should be sufficient accommodation, the Department will be prepared to admit also a strictly limited number of advanced Art Students. The instruction will include drawing and painting from the life model, and figure composition in relation to mural decoration and pictorial work.

Opportunities to study in the National Museum of Science and Art will be afforded to teachers and students attending the course.

Application for admission to this course must be made on Form S. 143.

#### IX.—LITHOGRAPHY.

Admission to this course will be limited to those who attended the courses in the subject previously conducted by the Department.

The course will include lectures on the theory and practice of Lithography, and will include demonstrations by the instructor. The teacher-students will prepare stones; draw on stone; transfer

to stone, etc., and print, by means of a hand press, in black and colour.

Application for admission to this course must be made on Form S. 143.

#### X.—LETTERING AND PROCESS WORK.

This course is intended for teachers in Schools of Art and Art Classes in Technical Schools as a medium for instruction in Decorative Design. The course in Lettering will include the development and modifications of letter characters from the Roman originals, with particular attention to the work of the Irish Scribes, and the use of lettering for such purposes as posters and display work of all kinds, and for addresses. The course in Process Work will consist of lectures and demonstrations on the principles of photography; the use of screens for half-tone negative making in monochrome; line and tone etching on zinc and copper; photo-transfers for use in lithographic printing; negative making by collodion and dry plate methods; the use of colour-filters for panchromatic photography.

Application for admission to this course must be made on Form S. 143.

#### XI.—ORNAMENTAL LEATHER WORK.

The course is intended for teachers in Schools of Art and Art Classes in Technical Schools as a suitable craft for instruction and practice in Decorative Design and for the further development of this form of work as a commercial possibility.

The instruction will include the various processes in the manipulation of leather for decorative purposes:—tooling, embossing, cutting, inlaying, interlacing, staining and gilding; the selection of skins; sources of supply; details of class organisation.

Application for admission to this course must be made on Form S. 143.

#### XII.—ADVANCED HOUSEWIFERY.

This course is intended for teachers holding the diploma of the Irish Training School of Domestic Economy, or certificates in Housewifery from other recognised Training Schools. The course will include instruction in upholstering chairs (wicker and wooden); renovating and recovering mattresses; making loose covers for chairs; making, fitting and renovating window blinds; altering and renovating carpets; renovating hats and trimmings, etc.

Application for admission to the course must be made on Form S. 146.

#### XIII.—ADVANCED DRESSMAKING.

This course is intended primarily for the further training in this subject of teachers holding the diploma of the Irish Training School of Domestic Economy, but applications from other teachers holding certificates in Dressmaking will be considered. The course will include the making of coats and skirts, fancy blouses, house frocks, etc., in up-to-date styles and methods.

Application for admission to the course must be made on Form S. 146.

#### XIV.—HYGIENE AND SICK NURSING.

Elementary and advanced courses will be held. Only teachers who have already satisfactorily attended a course in the subject, conducted by the Department, will be admitted to the advanced course.

The courses are primarily intended for teachers of Domestic Economy, at present engaged under local authorities, to enable them to obtain further practical knowledge of the laws of health and of first aid and home nursing, so that they may be able to introduce into their courses simple and well-directed instruction in these subjects.

Applications will also be considered from District nurses who desire to give instruction in the subject under local schemes of Technical Instruction.

The courses will include only as much Human Physiology as is necessary for the proper understanding of the laws of health, and will deal largely with home and personal hygiene, first aid to the injured, and the care of the young and of the sick in their own homes.

Application for admission to these courses must be made on Form S. 146.

#### XV.—EXPERIMENTAL SCIENCE.

Admission to the courses of instruction in Experimental Science of the Department's Programme for Day Secondary Schools will be restricted to teachers in Secondary Schools in which the Programme has been adopted.

Provided that a sufficient number of applications are received, courses will be held in each of the Special Courses of the Department's Programme.

The courses will not only cover the subject matter of the syllabuses of the Department's Programme, but will aim directly at bringing home to teachers the intentions of the Department as expressed in the prefatory note thereto.

*Teachers applying for admission will be expected to have done some reading in the subject of the course for which they apply.*

Provisional recognition to teach the subject of the course will be accorded to those teachers who have punctually and regularly attended and successfully done the class work, as testified by laboratory note-books, and by the examinations, written and practical, which will be held at the close of the course.

Application for admission to these courses must be made on Form S. 42.

#### XVI.—DRAWING AND MODELLING.

Facilities to attend the Metropolitan School of Art, Dublin, during the month of July, will be afforded to a limited number of teachers in Day Secondary Schools, in which the Department's Programme has been adopted, who are at present teaching Drawing, or who may desire to become teachers of Drawing, in such schools. Applicants for admission to this course should have received some previous training in Art subjects.

These facilities will not be offered to persons residing, or teaching in schools, within ten miles of Dublin, Belfast, Cork, Londonderry, Limerick or Waterford.

Teachers selected to attend the Metropolitan School of Art under these conditions will be required to attend such classes as the Headmaster of the School may direct.

Application for admission to the Metropolitan School of Art under the foregoing conditions must be made on Form S. 42.

#### XVII.—DOMESTIC ECONOMY.

These courses are intended for teachers who have already secured provisional recognition to give instruction in the Preliminary Course of Experimental Science of the Department's Programme for Day Secondary Schools, and who desire to obtain recognition as teachers of Domestic Economy in such schools.

Recognition to teach Domestic Economy in Day Secondary Schools during the Session 1916-17 will be given to those teachers who have punctually and regularly attended, and successfully done the class work, as testified by note-books and by the examinations, written and practical, which will be held at the close of the courses.

Teachers who have successfully attended three Summer Courses in Domestic Economy, under the conditions referred to above, and who have taught the subject for two complete sessions to the satisfaction of the Department's Inspectors, will be recognised as qualified to give instruction, in Day Secondary Schools, in the Preliminary Course in Experimental Science of the Department's Programme and in the Syllabuses of Domestic Economy. (*See Circular 25.*)

Application for admission to these courses must be made on Form S. 42.

#### XVIII.—MANUAL TRAINING (WOODWORK).

The object of this course is to provide training for teachers engaged in Day Secondary Schools so as to enable them to qualify to teach the subject in such schools. The full course of training is designed to extend over two years. The work of the first year will consist of a course of Drawing and Benchwork such as is set out in the Department's Programme for Day Secondary Schools. Recognition to give instruction in the subject in such schools during the Session 1916-17 will be accorded to those teachers who succeed in passing the first year examination. The work of the second year will cover a more extended course of Drawing and Benchwork, and, in addition, time will be devoted to the study of the theory of the subject, such as the management of classes, preparation of lessons, selection of tools and other equipment, etc. Those passing the second year examination will receive provisional recognition as teachers of the subject, which provisional recognition will be confirmed within five years of the date when first accorded if the conditions of Circular 24 are complied with, or such further tests passed as may be subsequently prescribed by the Department. The course will be registered by the Department of Technology of the City and Guilds of London Institute, but all teachers attending will be required to present themselves for the examination to be conducted at the close of the course.

Although this course is primarily intended for the training of teachers in Day Secondary Schools, applications will be considered from teachers in other schools working in connection with the Department.

Application for admission to the course must be made on Form S. 42.

### XIX.—RURAL SCIENCE (INCLUDING SCHOOL GARDENING).

Except in special circumstances, only those teachers will be admitted to the courses in this subject who have been recognised by the Commissioners of National Education as qualified to teach the syllabus of Elementary Experimental Science and Object Lessons of the Commissioners' Programme. Only those teachers who have successfully attended a course in the First Year Syllabus of Rural Science (including School Gardening) will be eligible for admission to the course in the Second Year Syllabus.

Teachers selected for the course in the First Year Syllabus will be required to attend at the Royal College of Science, Dublin, for the first week, and, during the remainder of the course, either at the Albert Agricultural College, Glasnevin, or the Technical School Garden, Kingstown, as may be decided by the Department. Teachers selected for the course in the Second Year Syllabus will be required to attend at Glasnevin or Kingstown, as above, for the first week, and at the Royal College of Science for the remainder of the course.

The teachers to be admitted to the course in the First Year Syllabus will be nominated by the Commissioners of National Education, and the Department cannot enter into correspondence with any of the applicants who may not be selected for admission. Applications for this course will be accepted only from male teachers.

Teachers who attend the course in the First Year Syllabus punctually and regularly and pass the examinations, written and practical, held at the close, will be recognised provisionally by the Commissioners of National Education as qualified to give instruction in the subject in National Schools. Teachers who successfully attend courses in both the First and Second Year Syllabuses will be granted a certificate of proficiency in the subject.

Application for admission to these courses must be made on Form S. 297.

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Form S. 141.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET, DUBLIN.

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### CONDITIONS UNDER WHICH THE DEPARTMENT WILL ACCORD RECOGNITION TO SUMMER COURSES OF INSTRUCTION, FOR TEACHERS IN DAY SECONDARY SCHOOLS, CONDUCTED AT LOCAL CENTRES, 1916.

*(For particulars of the Public Courses conducted by the Department see Form S. 41.)*

(1) Courses may be held in Experimental Science, Drawing and Modelling, and Domestic Economy.

(2) Only those teachers may be permitted to attend the Courses

whose admission thereto has been sanctioned, in writing, by the Department. The admission of teachers under 20 years of age will not be sanctioned. A Course which is to be attended by fewer than five teacher-students will not, as a rule, be recognised under these conditions.

(3) Courses must begin on Tuesday, the 4th July, and close on Friday, the 28th July.

(4) The hours of attendance of teacher-students will be from 10 a.m. to 4 p.m. daily (with an interval of one hour for lunch) except on Saturdays, when the hours of attendance will be from 10 a.m. to 1 p.m. In addition, teachers will be required in the evenings to write out notes, etc. The Department are prepared to consider applications for alternative arrangements, provided they allow of an equal period for teaching.

(5) The Instructors appointed to conduct Summer Courses must be specially qualified, and specially recognised by the Department to conduct training courses for Teachers.

(6) Except in the case of Drawing and Modelling, the Department will not approve of a class of more than ten students under one instructor. Assistant instructors must hold the Irish Secondary Teachers' Certificate in the subject of the Course, or equivalent qualifications.

(7) Concurrent instruction in different years' syllabuses in the same subject may be sanctioned if the conditions under which such instruction is to be given are regarded as suitable by the Department. Permission for concurrent instruction of classes in different subjects will not be given unless in very exceptional circumstances.

(8) Courses conducted under these conditions will be recognised for grants under the terms of Section III. of the Departments Programme for Technical Schools and Classes.

(9) Application for permission to conduct courses under these conditions should be made, not later than the 15th March, by letter, stating the subject or subjects in which it is proposed to provide instruction. The names of the instructors by whom it is proposed that courses should be conducted should be submitted for approval as early as possible. The Time Table of the classes must be furnished, on Form S. 54, not later than the 1st June.

(10) Teachers desiring to attend Courses must apply for permission, on Form S. 142, through the Managers of the Institution at which the course desired is to be held. The Department will, on application, after the 1st April, furnish a list of the Institutions which have applied for the recognition of courses. Teachers must make their own arrangements for their accommodation at these courses.

## DETAILS OF THE COURSES.

### EXPERIMENTAL SCIENCE.

The subjects of the courses of instruction may be:—First and Second Years of the Preliminary Course; Third and Fourth Year Special Courses in Physics, Chemistry, Botany, Physiology and Hygiene, and Physical and Commercial Geography.

The courses should not only cover the subject matter of the Syllabuses of the Department's Programme for Day Secondary



Schools, but should aim directly at bringing home to Teachers the intentions of the Department as expressed in the Prefatory Note thereto.

Provisional recognition to teach the subject of the course will be accorded to those teachers who have punctually and regularly attended and successfully done the class work, as testified by laboratory note-books, and by the examinations, written and practical, which will be held towards the close of the course.

#### DRAWING AND MODELLING.

These courses will provide further training for Teachers who hold the Irish Secondary Teachers' Drawing, or higher, Certificates, and will also provide the requisite training for candidates for the Teaching Certificates issued by the Department under the conditions of Form S. 240. Attendance at these courses does not confer a right to recognition as teachers of Drawing. *The Department will not arrange for special examinations at the close of courses in this subject.*

#### DOMESTIC ECONOMY.

These courses may be arranged for Teachers who have already obtained provisional recognition to give instruction in the Preliminary Course of Experimental Science of the Department's Programme for Day Secondary Schools, and who desire to obtain recognition as teachers of Domestic Economy in such schools. The course of instruction must include Cookery, the elements of Physiology and Hygiene, and Home Sewing, and should also include instruction in Laundry work.

Recognition to teach Domestic Economy in Day Secondary Schools during the forthcoming Session will be given to those teachers who have punctually and regularly attended and successfully done the class work, as testified by note-books and by the examinations, written and practical, which will be held towards the close of the course. Teachers who successfully attend three Summer Courses in Domestic Economy, under the conditions referred to above, and who teach this subject for two complete Sessions to the satisfaction of the Department's Inspectors, will be recognised as qualified to give instruction, in Day Secondary Schools, in the Preliminary Course of the Department's Programme of Experimental Science, and in the Syllabuses of Domestic Economy. (See Circular 25.)

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Form S. 31.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET, DUBLIN.

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#### SPECIAL EXAMINATION FOR TEACHERS' QUALIFICATIONS IN MANUAL TRAINING (WOODWORK), 1916.

If a sufficient number of candidates indicate their intention to present themselves, a Special examination for Teachers' qualifications in Manual Training (Woodwork) will be held in Dublin on

Tuesday and Wednesday, 13th and 14th June, 1916. The subjects and Time Table of the examination will be :—

TUESDAY, JUNE 13TH	.. 10 a.m. to 1.30 p.m.	Drawing.
" "	.. 2.15 to 5.15 p.m.	Theory.
WEDNESDAY, JUNE 14TH	.. 9.30 a.m. to 1 p.m.	Drawing on the Blackboard and Demonstration Exercise.
" "	.. 2 to 5 p.m.	Practical Wood- work Test.

A fee of 10s. will be charged for admission to this examination.

Tools, wood, drawing boards (imperial size), paper, pens and ink will be provided by the Department, but candidates will be required to bring mathematical instruments, pencils, erasers, etc., for the examination in Drawing; and, although tools for the Practical Woodwork Test will be provided by the Department, candidates are advised to bring their own, as no allowance can be made should the candidate not consider the tools supplied as satisfactory.

Applicants for admission to the examination must have been twenty-one years of age on or before the 1st January, 1916.  
Application for admission to the examination must be made, on Form S. 32, not later than the 1st May, and must be accompanied by the examination fee of 10s.

#### SYLLABUSES OF SUBJECTS OF EXAMINATION.

##### DRAWING (100 marks).

Finished Scale Drawings of simple joints, or combinations of joints. Representation on paper of solids in various positions, in plan, elevation, section, isometric and oblique projection.

##### THEORY (100 marks).

A written paper on the following subjects :—

Woods : nature, growth, supplies, cost, diseases, uses, etc.

Tools : construction and uses.

Manual Training : aim and object.

Class Management.

Workshop arrangement, equipment and cost.

Candidates should be able to illustrate their answers by freehand sketches.

##### PRACTICAL WOODWORK TEST (100 marks).

The construction of joints, or combinations of joints, from given dimensioned drawings or sketches.

The accuracy of dimensions, accuracy of fitting, and time taken will be considered.

##### DRAWING ON THE BLACKBOARD (50 marks).

Drawings—freehand and to scale—of subjects for class lessons, common joints, etc.

##### DEMONSTRATION EXERCISE (50 marks).

Short lesson for a class on a given subject in Woodwork, Drawing, or Theory.

To pass, candidates must obtain not less than 50 per cent. of the total number of marks, not less than 40 per cent. of the marks allotted to any subject, and not less than 50 per cent. in the case of the Demonstration Exercise.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET, DUBLIN.

### EXAMINATION IN THE PRINCIPLES, METHODS, AND HISTORY OF EDUCATION, 1916.

Provided that a sufficient number of Candidates indicate their intention to present themselves, an examination in the Principles, Methods, and History of Education, with special reference to Science Teaching, will be held on Saturday, the 24th June, 1916. The examination will be held in Dublin, and also, if a sufficient number of applications are received, in Belfast and Cork.

The test in this subject is provided for persons who have been provisionally recognised as Teachers of Experimental Science under the conditions of §§ I. (1) and II. (1) of the Department's Circular Letter (No. 28) of May, 1903, and the Department will not be prepared to admit applicants who are not qualified for such provisional recognition.

Applications for admission to the examination should be submitted not later than the 31st May, on Form S. 250, copies of which may be obtained from the offices of the Department.

A fee will not be charged for admission to the examination.

#### SYLLABUS OF EXAMINATION.

The history and criticism of opinion upon the Ends of Education and of the Curriculum as the means of attaining those ends, with special reference to the development and present state of instruction in Science.

The Endowment of the child as the basis of the educational process. The relation of Development to Endowment.

The main features of general development; the inter-relation of the Intellectual, Emotional and Active factors.

The chief stages in general development: their characteristics and normal order of appearance.

The most important differences between individual children with regard to the foregoing.

The general characteristics of the Curriculum and Methods of instruction in Science as determined by the laws of general development: the correlation of Science with other subjects of the Curriculum.

The nature and relations of the mental functions involved in the acquisition of Knowledge, individual differences with regard to these, especially in the characteristics of Attention and Imagery. The main principles of Exposition.

The general nature of the Inductive and Deductive processes: their relations to one another in the development of knowledge: their characteristics at different stages of general development.

The methodology of instruction in Science as determined by the laws of development of Knowledge: the functions and relations of laboratory work and class teaching.

The critical study of the history of a special branch of Science so far as it bears upon the teaching of the subject.

The general principles of Class-management : Order and Discipline : Class-management in the laboratory.

The use of note-books and text-books in Science teaching : methods of recording and treating observational data. Correlation of Science teaching with instruction in English and Drawing.

The construction and use of pictorial illustrations, diagrams and models : the construction of apparatus.

Supplementary means of instruction : records of daily or seasonal observations, the school excursion, school gardens and museums.

Laboratory organisation and management.

The following books may be consulted :—

Raymont : "The Principles of Education." (Longmans, Green & Co.)

Monroe : "A Brief Course in the History of Education." (Macmillan & Co.)

McDougall : "Psychology." (*Home University Library*, Williams & Norgate.)

Thomson : "Introduction to Science." (*Home University Library*, Williams & Norgate.)

Westaway : "Scientific Method." Books II., III., and IV. (Blackie & Sons.)

Armstrong : "The Teaching of Scientific Method." (Macmillan & Co.)

One of the three following :—

Dumville : "Fundamentals of Psychology." (Clive & Co.)

Green & Loveday : "Introduction to Psychology." (Clarendon Press.)

Welton : "Psychology of Education." (Macmillan & Co.)

One or more of the three following :—

Adams : "The Herbartian Psychology applied to Education." (D. C. Heath & Co.)

Adams : "Exposition and Illustration in Teaching." (Macmillan & Co.)

Adamson : "The Practice of Instruction." Part I. (National Society's Depository.)

One or more of the following :—

Adamson : "Practice of Instruction." Part II., Section VI. (National Society's Depository.)

Mann : "The Teaching of Physics." (Macmillan & Co.)

Perry : "The Teaching of Mechanics." (Macmillan & Co.)

Rennie : "Lessons in Plant and Animal Life." (Clive & Co.)

Smith & Hall : "The Teaching of Chemistry and Physics in the Secondary School." (Longmans, Green & Co.)

Various Articles in "The Teacher's Encyclopedia." (Caxton Publishing Co.)

One or more of the following :—

Cajori : "History of Physics." (Macmillan & Co.)

Mach : "The Science of Mechanics." (Keegan, Paul & Co.)

Thomson : "The Science of Life." (Blackie & Co.)

Thorpe : "Essays in Historical Chemistry." (Macmillan & Co.)

The Alembic Club Reprints. (Simpkin, Marshall & Co.)

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET, DUBLIN.

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### INDUSTRIAL SCHOLARSHIPS, 1916.

The Department will, in June, 1916, award a limited number of Industrial Scholarships to persons engaged in the Woollen industry.

The object of these Scholarships is to enable selected persons, who have already been engaged for at least two years in a woollen mill in Ireland, to undergo a course of instruction in a suitable institution, with a view to further training in *one* of the following branches of the industry :—(1) Blending, Carding, and Spinning ; (2) Designing ; (3) Dyeing ; (4) Milling and Finishing ; (5) Weaving.

Candidates must be recommended by the Managers of the woollen mills in which they are employed, and must also produce an undertaking from the Managers to the effect that they will be re-employed in the mills after the termination of their Scholarships. Candidates must also undertake to resume their employment on the termination of their Scholarships.

The Scholarships, which will be tenable for one year only, will be held at the South of Scotland Central Technical College, Galashiels, at the University of Leeds (Department of Textile Industries); or at some other institution, to be approved by the Department, in which the industry and the principles underlying it are taught. They will each be of the value of £1 per week during the period of instruction (usually about 36 weeks), together with travelling expenses (third class) for two double journeys between the address of the holder and the institution at which he is studying and the College fees.

Scholarship-holders will be selected by the Department on the result of a written examination in English, Arithmetic, and Drawing, and on consideration of the qualifications and experience of the applicants. The standard of the written examination will be equivalent to that of the Sixth Standard of the Board of National Education, and the examination will be based on the Syllabus set forth on p. 199.

Candidates may be required to attend for a personal interview at the Department's Offices; of which due notice will be given.

Candidates must be at least 17 years of age on the 1st July, 1916, and must have been born in Ireland, or have been resident in Ireland for three years immediately preceding that date.

Certificates of good character will be required in respect of all applicants, and selected candidates will be required to produce a medical certificate of health and an authenticated copy of certificate of birth.

The decision of the Department in regard to the selection of candidates, or to any other question arising out of these Scholarships, will be final.

Candidates must fill in and return, addressed to the Secretary of the Department, not later than the 20th May, 1916, Form S. 191, copies of which may be had on application.

SYLLABUS OF  
EXAMINATION (WRITTEN) FOR INDUSTRIAL SCHOLARSHIPS, 1916.

The examination will be held on Thursday, 8th June, 1916, at centres which will be fixed when all the applications have been received. The subjects and time-table of the examination will be :—

*Arithmetic.*—Thursday, June 8th, 11 a.m. to 12.30 p.m.

The principles of Vulgar and Decimal Fractions, with examples involving addition, subtraction, and multiplication.

Proportion, Simple Interest, Practice, Unitary Method.

The Metric System.

Methods of Weighing and Measurement.

Measurement of lengths, areas, and volumes.

*English.*—Thursday, June 8th, 1 p.m. to 2.15 p.m.

Composition : A short essay or letter of thirty or forty lines —with correct spelling, grammar and punctuation—on some familiar subject.

Ability to answer, in fully-formed sentences, questions on the meaning of words and phrases, and on the matter of a passage read.

Grammar : The construction of words ; prefixes, affixes, and roots.

Analysis of simple and complex sentences.

Correction of faulty sentences. Paraphrasing.

*Drawing.*—Thursday, June 8th, 2.30 p.m. to 3.30 p.m.

1. Freehand Drawing.

2. Simple exercises in Design.

3. Model Drawing of Simple Common Objects.

4. Simple Geometrical Drawing.

Candidates may be examined on any part of these Syllabuses. One hundred marks will be assigned for Arithmetic, one hundred for English, and fifty for Drawing.

Form S. 314.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET, DUBLIN.

SCHOLARSHIPS AT THE KILLARNEY SCHOOL OF  
HOUSEWIFERY.

The Department are prepared to offer to County Committees of Technical Instruction special facilities for the award of Scholarships for Girls, tenable at the Killarney School of Housewifery. This institution is under the Department's direct control and has for its object the Training of Girls in such work as would fit them for domestic service or the care of a home.

The following are the conditions under which Scholarships may be awarded :—

1. Applicants for the Scholarships must be resident in a rural district, and must have been in regular attendance at one of the

Courses of Instruction in Domestic Economy conducted by the Committee of Technical Instruction for the county, in the current or the previous session.

2. The scholars will be selected by the Department from the students nominated by County Committees of Technical Instruction. Each nomination must be accompanied by a report of the Domestic Economy Instructress upon the work of the applicant at the course of instruction attended.

3. Applicants for these Scholarships may be nominated for admission to the School on the 1st February or the 16th August. Nominations should be forwarded by County Committees so as to reach the Offices of the Department on or before the 1st of January or the 16th July.

4. The Scholarships will be tenable for the full course of training, which extends over about forty-six weeks.

5. A fee of £8, being one-half of the usual fee, will be payable by the County Committee in respect of each applicant nominated by them who is awarded a Scholarship, and the parent or guardian of the scholar will be required to pay the entrance fee of £1.

6. Scholars will be required to conform to all the conditions set forth in the School Programme.

7. The Department reserve the right to determine a Scholarship without notice upon being satisfied that its continuance is for any reason undesirable.

8. The decision of the Department in all questions arising in connection with the Scholarships shall be final.

Form S. 198.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET, DUBLIN.

TRADE SCHOLARSHIPS, 1916.

The Department will, in June, 1916, award a limited number of Trade Scholarships under the following conditions:—

(1) The object of these Scholarships is to enable apprentices who have been engaged in certain specified industries in Ireland, for a period of at least two years, to obtain systematic instruction in the principles of science and art as applied to these industries. Scholars will be required to attend specially arranged courses of instruction at the centres set out in Section (8) below. These courses are intended to raise the standard of workmanship and thereby benefit the industries as well as the scholars.

(2) Candidates must be recommended by the Managers of the industries in which they are employed, and must produce an undertaking from the Managers to the effect that the Managers will re-employ them after the termination of the Scholarships. Scholars must also undertake to resume their employment on the termination of the Scholarships.

(3) The Scholarships will be tenable for one school session (about 28 weeks). They will (except where the holder resides within

five miles of the School—(*see below*) be of the value of £1 per week during the period of instruction, together with class-fees and travelling expenses (third class) for two double journeys between the address of the holder and the centre at which his course is conducted.

When the home of the scholar is situated within a radius of 5 miles from the school he is to attend, a payment equal to the wages he would otherwise have received during the period of instruction will be allowed in addition to class-fees and any travelling expenses incurred.

(4) The scholars will be selected on consideration of the qualifications and experience of the applicants, and must have passed a simple qualifying examination to be held on the 8th June, 1916. The examination will include English, Arithmetic and Drawing, and the standard will be equivalent to that of the Sixth Standard of the Board of National Education. The examination will be based on the Syllabus set forth below (Appendix A).

(5) In the event of there being an insufficient number of qualified candidates to warrant the formation of a course of instruction in any of the three selected industries, no Scholarships will be awarded in connection with that industry.

(6) Scholars will be required to give their whole time to the prescribed course of instruction and must attend punctually and regularly. About 30 hours' instruction will be given in each week. In the event of a scholar proving unsatisfactory for any reason, the Scholarship may be terminated forthwith.

(7) For the session 1916-17 the industries selected are as follows:—

- (a) Book Production—(1) Typography, (2) Lithography, (3) Process Work.
- (b) Motor Engineering.
- (c) Bleaching and Dyeing (Linen and Cotton).

(8) The courses of instruction, of which Syllabuses are given (Appendix B), will be held at the following institutions:—

- (a) Book Production—City of Dublin Technical Schools, Bolton Street, Dublin; and the Metropolitan School of Art, Kildare Street, Dublin.
- (b) Motor Engineering—Pembroke Technical School, Ringsend, Co. Dublin.
- (c) Bleaching and Dyeing—Municipal Technical Institute, Belfast.

(9) Candidates must be at least 17 years of age on the 1st July, 1916, and must have been born in Ireland, or have been resident in Ireland for three years immediately preceding that date.

(10) Selected candidates will be required to produce a medical certificate of health and an authenticated copy of certificate of birth.

(11) The decision of the Department in regard to the selection of candidates, or to any other question arising out of these Scholarships, will be final.

(12) Candidates must fill in and return, addressed to the Secretary of the Department, not later than the 30th May, 1916, Form S. 199, copies of which may be had on application.



## APPENDIX A.

## SYLLABUS OF

## EXAMINATION (WRITTEN) FOR TRADE SCHOLARSHIPS, 1916.

The examination will be held on Thursday, 8th June, 1916, at centres which will be fixed when all the applications have been received. The subjects and time-table of the examination will be :—

*Arithmetic.*—Thursday, June 8th, 11 a.m. to 12.30 p.m.

The principles of Vulgar and Decimal Fractions, with examples involving addition, subtraction, and multiplication. Proportion, Simple Interest, Practice, Unitary Method. The Metric System. Methods of Weighing and Measurement. Measurement of lengths, areas, and volumes.

*English.*—Thursday, June 8th, 1 p.m. to 2.15 p.m.

Composition : A short essay or letter of thirty or forty lines—with correct spelling, grammar and punctuation—on some familiar subject.

Ability to answer, in fully-formed sentences, questions on the meaning of words and phrases, and on the matter of a passage read.

Grammar : The construction of words ; prefixes, affixes, and roots.

Analysis of simple and complex sentences.

Correction of faulty sentences. Paraphrasing.

*Drawing.*—Thursday, June 8th, 2.30 p.m. to 3.30 p.m.

Freehand Drawing.

Simple exercises in Design.

Model Drawing of Simple Common Objects.

Simple Geometrical Drawing.

Candidates may be examined on any part of these Syllabuses.

One hundred marks will be assigned for Arithmetic, one hundred for English, and fifty for Drawing.

## APPENDIX B.

## SYLLABUSES OF COURSES OF INSTRUCTION.

## I.—BLEACHING AND DYEING (LINEN AND COTTON).

## (a) BLEACHING AND DYEING.

The course will deal with the bleaching and dyeing of linen and cotton. It will be mainly practical.

**Bleaching** : cotton yarns, threads and cops. Calico. Muslins, lace curtains, linen yarns ; threads and cloths. **Mercerising** : methods and apparatus employed in mercerising cotton yarns in h nks or warps and cotton cloths. Materials employed in bleaching and finishing. Examination for purity.

**Machinery** : construction and use of machinery ; singeing and shearing machines ; high and low pressure boiling pots ; liming, souring, chemicking and washing machines ; rubbing boards ; squeezers ; hydro-extractors ; scutchers and openers ; drying machines ; water, starch and dry mangles ; back-starching machines ; stentering machines ; stretching, breaking and damping machines ; calenders, beetling machines, etc. Production of standard finishes.

**Dyeing** : mechanical, chemical and other theories. Machinery used in dyeing raw cotton cops, hanks, warps, chains and piece goods. Processes used and experiments in dyeing. Fastness of colours.

(b) **TEXTILE FIBRES.**

A general course on the nature and preparation of fibres and on their detection in cloths. Methods of manufacture.

(c) **CHEMISTRY.**

The course in Chemistry will deal with those branches of the subject which are of direct importance in bleaching and dyeing operations. It will consist partly of lectures and demonstrations and partly of practical work. In the latter, students will prepare a number of substances utilised in the trade, and will carry out experiments with these substances to enable them to obtain a knowledge of their properties and an intelligent understanding of the chemistry involved in bleaching and dyeing operations.

**Water** : Its physical properties ; boiling point ; influence of dissolved salts on boiling point ; solvent powers. Solution and solubility. Hardness of water ; impurities. Mechanical methods of purification. Chemical properties of water ; decomposition. Hydrogen and oxygen. Oxidation and reduction.

**Common Salt** : Source, purification and reaction with sulphuric acid. Common acids.

**Alkalis** : Lime. Action of alkalis on fibres. Mercerising. Action of alkalis on oils. Soaps and soap manufacture.

**Bleaching Agents** :—**Chlorine** ; preparation, properties and reactions. Theory of bleaching. Action of chlorine on lime ; hypochlorites. Other bleaching agents and their differences of action from chlorine.

**Metallic Salts** : different types of salts ; principles of formation ; interaction of salts ; double decomposition. Hydrates. Mordants—properties and mode of application of common metallic mordants. Mineral colours ; iron buff, manganese bronze, chrome, yellow, chrome orange, khaki, Prussian blue, etc.

*Organic substances* : Benzene—origin, properties and composition ; nitrobenzene ; aniline. Aniline Dyes. Other artificial colours. Natural dyes. Organic mordants ; tannic acid and tannin matters ; origin, general characters and chemical technology. Oil mordants. Assistants and fixing agents. Elements of the chemistry of starch and cellulose.

## II.—BOOK PRODUCTION.

### (1) TYPOGRAPHY.

All instruction will be on the Point System. The laying, composition and distribution of type. Mechanical composition by linotype and monotype machines. Imposition of news, magazine, pamphlet and book work. Making up formes for illustrated and display work in one, two, or more colours.

#### DRAWING :—

**Mechanical Drawing. Lettering :** The origin and development of letter forms and the modifications arising from various treatments and materials. Roman basic forms, Celtic, Gothic and Renaissance developments. Modern forms and their comparison with historic precedents. **Display work :** Sketching out display work of all kinds in an attractive manner. General use of colours and choice of colour schemes.

### (2) LITHOGRAPHY.

The preparation of, transferring to, and printing from litho stones and metal plates, by flat bed and rotary offset methods. Mixing of inks and colours. Copper and steel plate printing. Chromo Lithography and the preparation of photo-litho transfers. The use of shading mediums and transposition processes. Printing papers—their size, nature and qualities.

#### DRAWING :—

**Mechanical Drawing. Simple Free Drawing :** Practice in drawing from sight and from memory. Drawing in line and in tone. Drawing ornament from the flat and from the round, and practice in ornamental design. **Principles of colours :** Practice in drawing and painting in colours from simple compositions of objects and natural forms. **Pictorial and Decorative Composition :** The division of given spaces into agreeable masses ; the decorative treatment of forms, including the human figure, for illustration, show cards, posters, etc., in black and white and colours. **Lettering :** The development of lettering and general treatment for lithography

### (3) PHOTOGRAPHY AND PROCESS WORK.

Architectural and landscape photography. Copying, enlarging, developing, intensifying, reducing and printing negatives by various duplicating methods, and the reproduction, by mechanical processes

with dry plate and wet collodion, of illustrations in line and half-tone on zinc and copper, in fine and coarse screens in monochrome and colour. Etching by tub and acid-blast machine. The routing and mounting of line and tone blocks, and the preparation of photo-litho transfers.

#### DRAWING :—

Principles of light and shade. Composition in landscape. with analysis and comparison of the work of historic and modern artists. The introduction of the figure in landscape. Figure composition: general guiding principles and practice in the arrangement of suitable masses and agreeable lines.

### III.—MOTOR ENGINEERING.

[NOTE.—The Course will be largely practical, but will include a treatment of the scientific principles involved. The theoretical treatment will accompany the practical work.]

#### (a) PRACTICAL WORKSHOP WORK.

Principles and methods employed in the taking down and re-assembling of engines, gear boxes, differentials, and general mechanism. The examination and location of faults in motor-car mechanism. Location of faults which do not show in assembled mechanism. Repairing worn parts, including the lapping of unevenly worn crank shaft journals. Fitting new parts—making new parts to standard, and “out of standard.” Closing and lining up crank shaft bearings. Making and fitting bushes. Relining bearings with anti-friction metals. Making and fitting piston rings. Making and fitting valves. Making and pitching cans. Making and fitting nuts, bolts, studs, taper pins, etc. The treatment of steels and irons. Hardening and tempering. Case hardening irons and steels. Making, hardening, and tempering all classes of springs, both for tension and compression. Making, hardening, tempering, grinding, and setting of tools. Making cutters and special tools for special jobs. Making joints and couplings—Ball and socket—Knuckle—Cardan—etc. Treatment and working of materials used as electric insulators. Fitting and wiring motor-car ignition systems, car lighting sets, and engine starting sets. Treatment necessary for forming bends and flanges in pipes made of different materials, such as copper, brass, steel, iron, etc. Making and fitting pipe couplings and unions. Refacing old and fitting new plates in metal to metal clutches. Releathering of “leather to metal” clutches, and the treatment of the leather before fitting. Adjustment and timing of magnetos. Adjustment of carburettors. Ignition and valve timing of engines. Importance of lubrication and lubricants. Methods of securing efficient lubrication. Vice work and lathe work, including screw cutting. Forging, grinding, drilling, stocks and dies work. Making dies, taps, and screw plates. Brazing different materials such as brass, steel, iron, etc.

**(b) TESTING AND EXPERIMENTAL WORK.**

Experimental determination of the power absorbed by motor-car accessories such as Fans, Pumps, Magnetos, Starting Motors, Lighting Dynamos, Speedometers.

Experimental determination of the efficiency of :—

*Engines :—*

Single Cylinder, Two-Cylinder, Four-Cylinder, and Diesel Engines. High Speed and Low Speed Engines. Two-Cycle and Four-Cycle Engines.

*Transmission Mechanism :—*

Sliding gears. Epicyclic gears. Differential gears. Worm gears. Chains. Clutches.

*Electrical Apparatus :—*

Magnetos (High and Low Tension). Spark Coils. Car-lighting Dynamos. Engine-starting Motors. Accumulators.

Determination of the "all-round" efficiency of complete motor-cars from engine to road wheels.

Tests on different types of engines as regards the effect upon fuel consumption per brake-horse-power per hour, produced by changes in Load, Carburettion, Ignition, Compression, Valve Setting, Fuel.

Tests on the behaviour, vaporization, flash point, etc., of different fuels, with the object of emphasizing the modifications which they necessitate in designing, or converting, engines to run on petrol, oil, gas, crude oil, etc. Taking and interpreting indicator diagrams, and correcting any faulty running which they indicate.

**(c) MACHINE DRAWING AND DESIGN.**

The design and calculation, as regards the suitability of materials, and necessary strength of parts, of the different parts of a motor-car, and the preparation of complete working drawings; special attention being given to the importance of fitting accessories without weakening the design.

**(d) LECTURES ON THE CONSTRUCTION AND MODE OF ACTION OF MOTOR-CAR MECHANISM.**

## NOTES AND MEMORANDA.

The Department deeply regret to have to record the untimely death of Mr. James Holms Pollok, D.Sc., who

**Death of** on the 26th November, 1915, passed away at  
**Mr. J. H. Pollok,** the age of 47 years. Mr. James H. Pollok was

**D.Sc.** born at Govan, Scotland, and received his early education at the High School, in Glasgow. In 1883 he was sent to study chemistry in the University of Glasgow, and he graduated as B.Sc. in that University in 1887. He was then appointed Junior Assistant to the Professor of Chemistry in the University. Some years later Mr. Pollok resigned this post in order to devote himself to the development of certain industrial patents relating to improved processes discovered by him for the extraction of gold.

In 1896, Mr. Pollok returned to academic work, and was appointed Assistant Chemist in the Royal College of Science for Ireland. In this capacity he also acted as instructor in assay. He retained this post until 1913. By this time the Royal College of Science had been moved from its old home in Stephen's Green to the newer and far larger buildings in Upper Merrion Street. This change led to considerable extension in equipment and laboratory facilities, and to a further development in the direction of applied chemistry. The need for advanced teaching in physical chemistry and metallurgy had become imperative, and the Department recognising that Mr. Pollok possessed in a high degree the personal and scientific qualifications for effectively carrying out this work, appointed him to be Lecturer in Physical and Metallurgical Chemistry.

Mr. Pollok was a member of the Royal Irish Academy, and had officiated as Chairman of the Science Committee of the Royal Dublin Society. For many years he was Secretary, and afterwards Treasurer, of the Dublin Scientific Club. He had achieved a well-earned reputation as an industrial chemist, and was ever alert to new openings in applied chemistry which might benefit his adopted country. By his death Ireland has lost an earnest and able scientific worker.

An interesting and full account of Mr. Pollok's life and work has been contributed to the *Transactions of the Chemical Society* by Professor Gilbert T. Morgan, F.R.S., of the Royal College of Science for Ireland, and is published in Vol. 109 of the *Transactions*, pp. 389-94.

A meeting of the Agricultural Board was held at the Offices of the Department, 4 Upper Merrion Street, on Tuesday, 28th March, 1916. The following attended:—

The Right Hon. T. W. Russell, M.P., Vice-President of the Department (in the Chair); Mr. John Bourke; Meeting of the Mr. Alexander L. Clark, J.P.; Very Rev. Canon Agricultural Daly, D.D., P.P.; Mr. Robert Downes; Colonel Board. Sir N. T. Everard, Bart., H.M.L.; Sir Josslyn Gore-Booth, Bart., D.L.; Most Rev. Denis Kelly, D.D., Lord Bishop of Ross; Mr. John S. F. M'Cance, J.P., D.L.; Mr. George Murnaghan, J.P.; Mr. John D. O'Farrell; Mr. Patrick J. O'Neill, J.P.

Mr. T. P. Gill, Secretary of the Department; Mr. J. R. Campbell, B.Sc., Assistant Secretary in respect of Agriculture; Mr. J. S. Gordon, B.Sc., Deputy Assistant Secretary in respect of Agriculture and Chief Agricultural Inspector; Mr. H. G. Smith, M.A., LL.D., Chief Clerk; Mr. T. Butler, Superintendent of the Statistics and Intelligence Branch; Mr. J. P. Walsh, Clerk in Charge of Accounts; Mr. J. V. Coyle, B.L., Senior Staff Officer; and Mr. F. J. Meyrick, M.A., were also present.

Mr. J. V. Coyle acted as Secretary to the meeting.

A meeting of the Board of Technical Instruction was held at the Offices of the Department, 4 Upper Merrion Street, on the 22nd March, 1916. The following members attended:—

The Right Hon. T. W. Russell, M.P., Vice-President of the Department (in the Chair); Rev. Henry Evans, Meeting of the D.D., M.R.I.A., F.I.H.; Rev. T. A. Binlay, Board of M.A.; Mr. William Macartney, J.P.; Mr. Francis Technical M'Bride, J.P.; Mr. John A. McClelland, M.A., Instruction. D.Sc., F.R.S.; Rev. P. J. Manly, P.P.; Mr. Seaghan T. O'Ceallaigh; Alderman Philip O'Donovan; Mr. Richard Sisk; Mr. Alexander Taylor.

Mr. T. P. Gill, Secretary of the Department; Mr. George Fletcher, F.G.S., Assistant Secretary in respect of Technical Instruction; Mr. H. G. Smith, M.A., LL.D., Chief Clerk; Mr. T. Butler, Superintendent of the Statistics and Intelligence Branch; Mr. J. V. Coyle, B.L., Senior Staff Officer; Mr. A. Kelly and Mr. W. Bowers were also present.

Mr. J. V. Coyle acted as Secretary to the meeting.

The Board had the following matters under consideration: Industrial, Trade and Apprentice Scholarship Schemes; Summer Courses; Industrial Training; Instruction in Applied Art; School Gardening, etc.

Attention is directed to the three new statistical tables which appear on pp. 534-36, showing the average retail prices at 42 towns in Ireland of feeding stuffs on the first of each of the months January, February, March, and April, 1916, and of Agricultural Seeds and Fertilisers on the first of each of the months March and April, 1916. These averages are compiled from Returns received from the Itinerant Instructors in Agriculture, who furnished particulars of prices at the following towns :—

*Leinster* : Carlow, Dublin, Dundalk, Kilkenny, Longford, Maryborough, Mullingar, Naas, Tullamore, Wexford, Wicklow.

*Munster* : Bandon, Clonmel, Cork, Ennis, Fermoy, Kanturk, Kilmallock, Kilrush, Kinsale, Listowel, Newcastle-West, Roscrea, Tralee, Waterford.

*Ulster* : Armagh, Ballymena, Belfast, Cavan, Castleblayney, Enniskillen, Letterkenny, Monaghan, Omagh.

*Connaught* : Ballina, Boyle, Castlebar, Loughrea, Manorhamilton, Roscommon, Sligo, Tuam.

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In connection with the Scheme for Encouraging Improvement in the Management of Creameries, an examination in Dairy Technology, Dairy Bacteriology, Dairy Engineering, Physical Science and Business Methods, as applied to Creamery Management, is held annually by the Department.

Certificates of having passed the examination held on 21st and 22nd March, 1916, were awarded to the undermentioned candidates, whose names are given in alphabetical order :—

Mr. John Casey, Cordal Creamery, Castleisland, Co. Kerry.

Mr. Patrick Elliott, The Creamery, Belleek, Co. Fermanagh.

Mr. Denis Ryan, Monagea Co-operative Creamery, Newcastle-West.

Mr. Michael Walsh, Spink Co-operative Agricultural and Dairy Society, Ltd., Booleybeg, Abbeylisk, Queen's County.

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The Department are informed by the Board of Trade that the quantities of carbonate of soda (washing soda) available during the next few months will certainly be less than normal. In these circumstances, and in view of the restricted facilities for the transport of supplies to Ireland from Great Britain, the Department would earnestly impress upon vendors and users of this article for spraying purposes the importance of placing their orders immediately.



The Department also desire to direct attention again to the necessity for acquiring at once supplies of copper sulphate required for spraying purposes. The following is an extract from a recent letter of the Board of Trade on the subject :—

“I am to explain that the Board have been endeavouring to create a reserve stock of sulphate of copper for the agricultural and industrial necessities of the United Kingdom (of which the greater part is Irish) by the retention of a proportion of each month's output since January last, but in view of the present accumulation and of the apparent apathy of the Irish agricultural interests they are proposing to allow the immediate exportation of about 1,000 tons out of the estimated existing reserve of 3,500 tons, it being borne in mind that agricultural use in this country is more urgent after than before June, while the French and Italian wine industries require the produce at once.”

In order to ensure that adequate supplies of spraying materials will be available when required by farmers, it is of the utmost importance that merchants should not only order these materials at once, but that they should take steps to secure immediate delivery.

Attention is also directed to the statement on pp. 480-81.

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The Department will in June, 1916, award a limited number of Trade and Industrial Scholarships. The object of the Trade Scholarships is to enable apprentices who have been engaged in certain specific industries in Ireland to obtain systematic instruction in the principles of science and art as applied to these industries. The object of the Industrial Scholarships is to enable selected persons who have already been engaged for at least two years in a woollen mill in Ireland to undergo a course of instruction in a suitable institution with a view to further training in one of the following branches of the industry :—(1) Blending, Carding and Spinning; (2) Designing; (3) Dyeing; (4) Milling and Finishing; (5) Weaving.

Full particulars with regard to these Trade and Industrial Scholarships are published on pages 498 and 500.

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According to the recently issued Report on the Trade in Imports and Exports at Irish Ports during the year ended 31st December, 1914 (Cd. 8208, 1916), it is important to note that a very large proportion of even the imports into Ireland consists of agricultural produce :—bacon, eggs, poultry,

butter, grain, flour, food stuffs, fruit, and vegetables. And if to these articles are added flax, hides, wool, skins, etc., which are included under raw materials, the total import of farm produce alone reaches £22,500,000.

In the case of exports from Ireland, live stock, bacon and hams, butter, poultry, eggs, oats, potatoes, vegetables, and flax, etc., together with the products of the live stock industries, such as hides, skins, wool, feathers, etc., amount to a value of £37,800,000, or nearly half the total exports of Ireland. Large as this export is, the fact is seldom realised that Ireland, while exporting annually farm produce and food stuffs to the value of £37,800,000 is importing food stuffs and farm commodities of a value of £22,500,000.

The chief agricultural export of Ireland is live stock, which amounted in 1914 to a total estimated value of **Live Stock.** £17,572,215, a decrease of nearly £2,000,000 as compared with the export of 1913, but showing an increase of over £5,000,000 as compared with the export in 1912. The high figure for 1913 was mainly due to the very large numbers of store cattle which were held back from shipment during the second half of the year 1912 in consequence of the restrictions imposed on the exportation of live animals through the outbreak of foot and mouth disease, and which were exported in the early months of 1913. High prices on account of the big demand for beef in Great Britain, brought about by war conditions, induced the Irish farmers to dispose of large numbers of fat cattle for cross-channel export during the last four months of 1914. The numbers exported from Ireland during that period amounted to 278,786 compared with 144,569—the average for the corresponding months of the previous five years. The total value of the exports of cattle in 1914 is estimated at £14,345,161 as compared with £15,464,468 in 1913, £8,286,868 in 1912, and £9,566,393 in 1911. The total number of cattle shipped in 1914 amounted to 945,410, which, with the exception of the year 1913, is the highest figure on record since 1878, when the published returns of the exports of animals from Ireland were first issued. The shipments of sheep and lambs fell to 539,107 in 1914, which is less than the number exported in any year since 1884. The number of pigs exported only amounted to 147,924, which is the lowest figure on record. The number of horses exported decreased from 36,643 in 1913 to 30,940 in 1914, the decrease in value being estimated as £272,215. Horses purchased in Ireland by the Army Authorities and subsequently exported are not included in these figures.

The exports and imports of beef, mutton, bacon and hams, etc., form also a very important and interesting class.

**Dead Meat.** In 1914 the total value of these exports from Ireland was estimated at £5,287,080 while the corresponding imports amounted to £2,749,127.

The total value of dead meat exported from Ireland was the highest recorded since 1904. The increase compared with 1913 took place chiefly in the value of beef and mutton shipped from Ireland which amounted to £480,908 in 1914 compared with £114,524 in 1913, and £266,300 in 1912. The value of bacon and hams exported was slightly less than in 1913 and 1912; in 1914 it amounted to £4,064,881. If to this export is added the export of pork and coarse pig meat, the value of the products of the pig exported will amount to over £4,600,000. It is interesting thus to note that, including the export of live pigs, the total export value of pigs and pig products in 1914 amounted to a sum of over £5,300,000 sterling.

The returns indicate an increase in the export of poultry as compared with 1913. The estimated value ex-

**Poultry and Eggs.** ported in 1914 amounted to £1,071,889 as compared with £986,241 in 1913. It is estimated that one-third of these values represented live poultry. There was an increase in the quantity of eggs exported in 1914 as compared with 1913, the total quantity exported being the greatest recorded in this series of returns. The export in 1914 amounted to 6,824,612 gt. hds. with an estimated value of £3,383,870, as compared with 6,398,235 gt. hds. valued at £3,019,167 in 1913.

The exports of eggs and poultry together in 1914 amounted to £4,455,759, and if to this is added the export of feathers, amounting in 1914 to £31,567, a total export of £4,487,326 is recorded. These figures do not include consignments sent by parcel post.

The quantity and value of butter exported in 1914 were greater than in any previous year for which records are

**Butter.** available. The export in 1914 amounted to 855,068 cwt. with an estimated value of £4,641,673 as compared with 725,368 cwt. valued at £3,735,645 in 1913. As in the case of eggs, these figures do not include consignments sent by parcel post. There is also difficulty in obtaining a record of small consignments of butter under 28 lbs. as these are frequently entered in the returns as "parcels" or "sundries."

Much the largest import among the grain foods for human consumption is wheat and wheat flour. The quantities

**Wheat and Flour.** and estimated values imported into Ireland in the year 1914 were as follows :—wheat, 7,295,225 cwt. valued at £3,813,248 ; wheat flour, 5,198,035

cwt. valued at £2,858,919.

The quantity of wheat imported in 1914 was less than in any year since 1908, though the imports of wheat flour showed an increase in 1914, and the value was the highest recorded. In the agricultural statistics of Ireland the amount of Irish-grown wheat in 1914 was estimated at 758,154 cwts., and if it is assumed that one and a-half tons of wheat produce one ton of flour, the total quantity of flour represented by imports of wheat and flour and by home-grown wheat amounted to 10,566,954 cwts. From this quantity has to be deducted an export of flour, or its equivalent in wheat, amounting to 193,299 cwts., leaving thus a residue of 10,373,655 cwts. for consumption in Ireland.

The import of barley decreased from 1,521,715 cwts. in 1913 to 804,736 cwts. in 1914, but this decrease was

**Barley and Oats.** counterbalanced by increased imports of malt, which amounted to 1,216,943 cwts. in 1914, as compared with 746,069 cwts. in 1913. The export

of oats increased from 1,475,509 cwts. in 1913 to 1,540,569 cwts. in 1914.

Among cattle feeding stuffs the chief import is maize, a very great quantity of which is annually imported into Ireland. A considerable quantity, however,

**Cattle Feeding Stuff, Maize, etc.** is each year re-exported—in 1914 to the value of £261,627. The total quantity of maize imported in 1914 amounted to 13,128,145 cwt.

with an estimated value of £4,102,545. Together with the above import of maize, the imports of bran-pollard, and the various classes of cattle meals and cakes, brought the total value of feeding stuffs imported in 1914 to a sum estimated at £5,446,915 as compared with £5,422,110 in 1913.

## STATISTICAL

## FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast. *(Erris Head to Torr Head).				East Coast. (Torr Head to Carnsore Point).			
	1916.		1915		1916.		1915	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, . . . . .	—	—	—	—	13	75	16	71
Soles, . . . . .	—	—	1	3	27	184	28	167
Turbot, . . . . .	—	—	—	—	18	116	16	88
Total Prime Fish, . .	—	—	1	3	58	375	60	326
Cod, . . . . .	83	83	286	221	546	1,492	830	1,112
Conger Eel, . . . . .	3	9	14	13	68	82	133	130
Haddock, . . . . .	54	59	158	147	34	39	43	45
Hake, . . . . .	—	—	—	—	70	194	29	51
Herrings, . . . . .	1,295	1,400	1,250	668	15,889	12,501	6,009	2,556
Ling, . . . . .	—	—	—	—	—	—	24	18
Mackerel, . . . . .	545	365	1,015	428	—	—	—	—
Plaice, . . . . .	5	5	10	10	361	683	423	878
Ray or Skate, . . . .	31	14	155	48	130	138	195	140
Sprats, . . . . .	—	—	—	—	—	—	—	—
Whiting, . . . . .	19	20	43	31	1,310	1,827	566	593
All other except Shell Fish	—	—	12	9	304	343	367	345
Total, . . . . .	2,035	1,955	2,944	1,578	18,770	17,674	8,679	6,194
SHELL FISH :— . . . .	No.	—	No.	—	No.	—	No.	—
Crabs, . . . . .	—	—	—	—	—	—	—	—
Lobsters, . . . . .	—	—	688	20	839	43	1,785	84
Mussels, . . . . .	—	—	120	10	—	—	165	29
Oysters, . . . . .	—	—	—	—	—	—	—	—
Other Shell Fish, . . .	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
	9	5	20	3	39	17	24	14
Total, . . . . .	—	5	—	33	—	60	—	127
Total value of Fish landed	—	1,960	—	1,611	—	17,734	—	6,321

NOTE—The above figures are subject to monthly returns previous to and including December, 1914, the extent of each of the Coast—Torr Head to Carnsore Point; South Coast—Carnsore

## TABLES.

## IRELAND.

as landed on the IRISH COASTS during the month of January, 1916, as corresponding period in 1915.

South Coast. (Carnsore Point to Loop Head).				West Coast. (Loop Head to Erris Head).				Total.			
1916		1915.		1916		1915.		1916.		1915.	
Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
4	14	17	40	—	—	—	—	17	89	33	111
23	130	25	139	11	37	15	55	61	351	69	364
3	14	3	17	9	43	8	35	30	173	27	140
30	158	45	196	20	80	23	90	108	613	129	615
10	19	13	20	56	44	123	52	695	1,638	1,252	1,405
—	—	—	—	7	4	93	46	78	95	240	189
—	—	—	—	33	57	33	33	121	155	234	225
—	—	—	—	—	—	—	—	70	194	29	51
2,618	2,922	8,637	4,106	378	276	229	86	20,180	17,099	16,125	7,416
—	—	1	1	9	7	77	53	9	7	102	72
2,180	1,766	519	383	250	276	—	—	2,975	2,407	1,534	811
42	71	112	160	22	28	36	29	430	787	581	1,077
54	31	69	15	7	3	36	8	222	186	455	211
536	161	38	10	—	—	—	—	536	161	38	10
3	3	1	1	20	23	30	28	1,352	1,873	640	653
55	51	135	64	11	14	33	22	370	408	547	440
5,528	5,182	9,570	4,956	813	812	713	447	27,146	25,623	21,906	13,175
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
—	—	—	—	—	—	—	—	—	—	—	—
Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
2,533	357	1,095	164	—	—	160	12	2,533	357	1,540	215
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
21,636	38	18,648	37	18,480	31	16,680	35	40,116	69	35,328	72
Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
435	171	450	144	699	172	832	158	1,182	365	1,326	319
—	566	—	345	—	203	—	205	—	834	—	710
—	5,748	—	5,301	—	1,015	—	652	—	26,457	—	13,885

to correction in Annual Returns.

Coasts referred to therein was as follows :—North Coast—Rossan Point to Torr Head; East Point to Kenmare; West Coast—Kenmare to Rossan Point.

## FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the Fish returned  
compared with the

Kinds of Fish.	North Coast. *(Erris Head to Torr Head.)				East Coast. (Torr Head to Carnsore Point.)			
	1916.		1915		1916		1915.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, . . . . .	—	—	—	—	12	55	8	41
Soles, . . . . .	1	3	—	—	25	163	10	74
Turbot, . . . . .	—	—	—	—	17	106	9	53
Total Prime Fish, .	1	3	—	—	54	321	27	168
Cod, . . . . .	431	429	583	603	977	1,540	899	1,066
Conger Eel, . . . .	7	10	9	14	63	68	85	81
Haddock, . . . . .	330	302	180	173	79	101	41	45
Hake, . . . . .	—	—	—	—	80	150	41	67
Herrings, . . . . .	6,122	6,208	11,380	6,007	1,218	1,172	1,435	622
Ling, . . . . .	—	—	3	4	1	1	48	36
Mackerel, . . . . .	695	527	47	21	—	—	—	—
Plaice, . . . . .	7	8	9	10	538	851	330	675
Ray or Skate, . . .	211	103	305	130	167	170	132	117
Sprats, . . . . .	—	—	—	—	—	—	—	—
Whiting, . . . . .	138	126	51	38	1,761	2,836	385	495
All other except Shell Fish	3	4	116	30	511	522	360	319
Total, . . . . .	7,945	7,720	12,683	7,030	5,449	7,732	3,783	3,691
SHELL FISH:—	No.	—	No.	—	No.	—	No.	—
Crabs, . . . . .	—	—	—	—	—	—	—	—
Lobsters, . . . . .	540	16	652	17	1,215	68	1,007	43
Mussels, . . . . .	—	—	—	—	80	8	150	26
Oysters, . . . . .	No.	—	No.	—	No.	—	No.	—
Other Shell Fish, . .	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
Total, . . . . .	—	16	—	20	—	98	—	79
Total value of Fish landed	—	7,736	—	7,050	—	7,830	—	3,770

NOTE.—The above figures are subject

\* In monthly returns previous to and including December, 1914, the extent of each  
Torr Head; East Coast—Torr Head to Carnsore Point; South Coast—

## IRELAND.

as Landed on the Irish Coasts during the month of February, 1916, as corresponding period in 1915.

South Coast. (Carnsore Point to Loop Head.)				West Coast. (Loop Head to Erris Head.)				Total.			
1916.		1915.		1916.		1915.		1916.		1915.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
9	34	9	19	2	8	—	—	23	97	17	60
41	259	32	180	15	70	14	61	88	492	56	315
6	34	3	12	12	52	11	44	35	192	23	109
62	327	44	211	29	130	25	105	146	781	96	484
31	49	8	12	166	127	233	139	1,605	2,145	1,723	1,820
6	5	—	—	108	86	62	34	184	169	156	129
—	—	—	—	53	76	83	108	462	479	304	326
—	—	—	—	—	—	—	—	80	150	41	67
420	198	209	97	56	41	—	—	7,816	7,619	13,024	6,726
26	49	15	14	87	92	131	141	114	142	197	195
1,524	1,143	1,250	585	158	156	621	367	2,377	1,826	1,918	973
148	262	134	131	31	44	28	26	724	1,165	501	842
102	50	44	10	49	33	54	14	529	356	535	271
—	—	—	—	—	—	—	—	—	—	—	—
3	2	—	—	46	81	23	7	1,948	3,045	459	540
66	52	91	48	18	20	18	24	598	598	585	421
2,388	2,137	1,795	1,108	801	886	1,273	965	16,583	18,475	19,539	12,794
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
—	—	—	—	—	—	—	—	1,755	84	1,659	60
Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
810	120	582	58	—	—	—	—	890	128	732	84
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
1,128	8	11,442	25	13,920	29	8,280	17	15,048	37	19,722	42
Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
460	173	318	63	1,070	294	658	158	1,575	489	1,014	234
—	301	—	146	—	323	—	175	—	738	—	420
—	2,438	—	1,254	—	1,209	—	1,140	—	19,213	—	13,214

to correction in Annual Returns.

of the Coasts referred to therein was as follows :—North Coast—Rossan Point to Carnsore Point to Kenmare ; West Coast—Kenmare to Rossan Point



## FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast. * (Erris Head to Torr Head.)				East Coast. (Torr Head to Carnsore Point.)			
	1916.		1915.		1916.		1915.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, . . . . .	—	—	—	—	16	89	3	9
Soles, . . . . .	—	—	—	—	8	73	5	31
Turbot, . . . . .	—	—	—	—	11	82	5	24
Total Prime Fish, . . . . .	—	—	—	—	35	244	13	64
Cod, . . . . .	253	233	576	393	3,260	3,896	2,354	1,866
Conger Eel, . . . . .	9	2	40	56	85	96	78	57
Haddock, . . . . .	73	72	167	132	35	42	30	32
Hake, . . . . .	—	—	—	—	126	278	93	139
Herrings, . . . . .	5,104	4,474	13,211	4,876	105	61	804	187
Ling, . . . . .	—	—	—	—	1	1	6	3
Mackerel, . . . . .	4	3	59	32	—	—	—	—
Plaice, . . . . .	46	57	88	98	166	341	280	396
Ray or Skate, . . . . .	292	99	309	103	143	182	106	59
Sprats, . . . . .	—	—	—	—	—	—	—	—
Whiting, . . . . .	34	30	4	3	1,772	2,149	475	447
All other except Shell Fish	5	4	443	180	684	639	311	191
Total, . . . . .	5,820	4,974	14,897	5,873	6,412	7,929	4,550	3,441
SHELL FISH:— . . . . .	No.	—	No.	—	No.	—	No.	—
Crabs, . . . . .	—	—	198	1	—	—	—	—
Lobsters, . . . . .	—	—	314	10	435	24	2,065	109
Mussels, . . . . .	Cwt. 8	2	—	—	Cwt. 300	45	Cwt. 132	23
Oysters, . . . . .	No.	—	No.	—	No. 630	1	No. 3,150	4
Other Shell Fish, . . . . .	Cwt. 72	27	Cwt. 30	5	Cwt. 120	67	Cwt. 72	24
Total, . . . . .	—	29	—	16	—	137	—	160
Total value of Fish landed	—	5,003	—	5,889	—	8,066	—	3,601

NOTE.—The above figures are subject  
 \* In monthly returns previous to and including December, 1914, the extent of each Head; East Coast—Torr Head to Carnsore Point; South Coast—

## IRELAND.

as landed on the IRISH COASTS during the month of March, 1916, as corresponding period in 1915.

South Coast. (Carnsore Point to Loop Head.)				West Coast (Loop Head to Erris Head.)				Total.			
1916.		1915.		1916.		1915.		1916.		1915.	
Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
23	88	24	49	—	—	—	—	39	177	27	58
231	1,454	164	865	12	48	11	40	251	1,575	180	936
15	73	11	48	10	49	11	46	36	204	27	118
269	1,615	199	962	22	97	22	86	326	1,956	234	1,112
17	49	20	29	262	231	511	331	3,792	4,409	3,461	2,619
4	4	—	—	193	174	170	85	291	276	288	198
—	—	—	—	51	53	153	154	159	167	350	318
1	1	—	—	—	—	3	1	127	279	96	140
35	25	14	7	67	67	113	35	5,311	4,627	14,142	5,105
56	77	31	27	120	107	186	178	177	185	223	208
5,720	4,651	2,089	1,089	543	418	14	7	6,267	5,072	2,162	1,128
230	354	289	259	39	24	38	42	472	776	675	795
185	115	177	54	78	50	81	21	698	446	673	237
40	20	—	—	—	—	—	—	40	20	—	—
—	—	1	1	20	6	10	5	1,826	2,185	490	456
87	96	212	158	57	51	49	42	833	790	1,015	571
6,644	7,007	3,012	2,586	1,443	1,278	1,350	987	20,319	21,188	23,809	12,887
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
—	—	60	3	—	—	18	—	—	—	198	1
—	—	—	—	—	—	—	1	435	24	2,457	123
Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
295	52	207	31	—	—	—	—	603	99	339	54
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
2,520	6	7,434	15	17,880	37	9,960	21	21,030	44	20,544	40
Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
323	120	264	60	410	108	739	208	935	322	1,105	297
—	178	—	109	—	145	—	230	—	489	—	515
—	7,185	—	2,695	—	1,423	—	1,217	—	21,677	—	13,402

to correction in Annual Returns.  
of the Coasts referred to therein was as follows : North Coast—Rossan Point to Torr  
Carnsore Point to Kenmare; West Coast—Kenmare to Rossan Point.

STATEMENT of the TOTAL QUANTITY of FISH landed on the ENGLISH and WELSH COASTS during the Month and Three Months ended 31st March, 1916, compared with the corresponding periods of the Year 1915.

KINDS OF FISH.	March.		Three months ended 31st March.	
	1916.	1915.	1916.	1915.
	QUANTITY.			
	Cwt.	Cwt.	Cwt.	Cwt.
Brill, . . . . .	482	758	1,796	2,465
Soles, . . . . .	1,574	3,243	4,332	8,769
Turbot, . . . . .	1,393	2,717	4,380	7,204
Prime Fish not separately distinguished, . . . . .	—	—	—	—
Total Prime Fish, . . . . .	3,449	6,718	10,508	18,438
Bream, . . . . .	1,612	3,839	4,900	12,482
Catfish, . . . . .	3,464	3,445	5,894	6,952
Coalfish, . . . . .	21,229	30,527	34,450	56,463
Cod, . . . . .	136,267	206,503	268,698	473,693
Conger Eels, . . . . .	2,780	4,977	6,860	12,039
Dabs, . . . . .	4,196	8,318	10,874	22,986
Dogfish, . . . . .	2,783	2,011	9,310	11,171
Dory, . . . . .	22	37	46	98
Flounders or Flukes, . . . . .	489	581	629	1,002
Gurnards, . . . . .	3,876	6,889	7,062	12,529
Haddock, . . . . .	36,089	80,161	123,700	221,085
Hake, . . . . .	4,496	16,223	12,556	42,303
Halibut, . . . . .	1,287	1,874	3,015	4,429
Latchetts (Tubs), . . . . .	6	17	15	111
Lemon Soles, . . . . .	2,023	2,106	4,278	4,464
Ling, . . . . .	4,990	7,198	11,743	12,598
Megrims, . . . . .	806	2,446	2,159	4,711
Monks (or Anglers), . . . . .	1,498	1,977	4,388	5,507
Mullet (Red), . . . . .	10	3	23	3
Plaice, . . . . .	18,441	25,942	51,356	65,201
Pollack, . . . . .	1,263	6,376	2,114	8,119
Skates and Rays, . . . . .	12,992	19,193	36,258	49,682
Torsk, . . . . .	76	953	312	1,994
Whiting, . . . . .	10,304	22,638	35,034	62,710
Witches, . . . . .	263	506	723	1,162
Herrings, . . . . .	66	136	16,126	9,178
Mackerel, . . . . .	11,092	53,985	17,506	70,335
Mullet (Grey), . . . . .	336	236	383	386
Pilchards, . . . . .	—	—	139	—
Sprats, . . . . .	22	2,083	21,474	49,390
Whitebait, . . . . .	373	359	979	1,001
Fish not separately distinguished, . . . . .	15,360	20,015	34,866	45,824
Total Wet Fish, . . . . .	301,980	538,272	738,378	1,288,051
Shell Fish:—	No.	No.	No.	No.
Crabs, . . . . .	32,236	230,637	67,164	340,032
Crawfish (Crayfish) . . . . .	63	93	63	281
Lobsters, . . . . .	7,163	16,816	13,219	24,347
Oysters, . . . . .	3,987,466	3,573,508	12,688,923	9,855,631
Other Shell Fish, . . . . .	Cwt. 33,732	Cwt. 43,233	Cwt. 120,784	Cwt. 138,667

NOTE.—The figures for 1916 are subject to revision.  
In addition 31,121 cwts. were reported to have been landed at English and Welsh ports by Belgian fishing vessels during the quarter.

STATEMENT of the TOTAL VALUE of FISH landed on the ENGLISH and WELSH COASTS during the Month and Three Months ended 31st March, 1916, compared with the corresponding periods of the Year 1915.

KINDS OF FISH.	March.		Three months ended 31st March.	
	1916.	1915.	1916.	1915.
	VALUE.			
	£	£	£	£
Brill, . . . . .	2,331	3,083	9,565	10,155
Soles, . . . . .	15,042	25,826	42,122	65,136
Turbot, . . . . .	7,607	11,646	26,395	33,336
Prime Fish not separately distinguished, . . .	—	—	—	—
Total Prime Fish, . . .	24,980	40,555	78,082	108,627
Bream, . . . . .	1,969	3,112	5,975	10,118
Catfish, . . . . .	3,717	2,741	7,413	5,793
Coalfish, . . . . .	16,533	16,040	32,789	31,855
Cod, . . . . .	173,122	194,343	453,343	499,790
Conger Eels, . . . . .	4,091	4,904	10,885	12,182
Dabs, . . . . .	7,683	14,827	23,904	47,010
Dogfish, . . . . .	1,764	930	7,949	6,364
Dory, . . . . .	47	58	104	148
Flounders or Flukes, . . .	703	535	908	926
Gurnards, . . . . .	2,602	3,197	5,606	6,225
Haddock, . . . . .	81,352	114,728	311,603	306,512
Hake, . . . . .	10,966	27,446	34,447	74,266
Halibut, . . . . .	6,101	8,201	15,460	20,895
Latchets (Tubs), . . . . .	8	12	22	114
Lemon Soles, . . . . .	8,832	7,224	20,804	16,817
Ling, . . . . .	6,264	6,182	17,539	11,399
Megrim, . . . . .	1,782	3,522	5,846	7,156
Monks (or Anglers), . . . .	2,010	1,580	6,229	4,535
Mullet (Red), . . . . .	47	13	122	13
Plaice, . . . . .	52,049	58,969	166,594	154,648
Pollack, . . . . .	1,863	4,867	3,558	6,791
Skates and Rays, . . . . .	20,109	20,204	60,514	54,412
Torsk, . . . . .	106	540	510	1,135
Whiting, . . . . .	18,938	25,748	68,876	72,626
Witches, . . . . .	842	1,265	2,450	3,008
Herrings, . . . . .	83	88	24,872	8,661
Mackerel, . . . . .	12,927	31,481	21,191	44,475
Mullet (Grey), . . . . .	504	293	581	573
Pilchards, . . . . .	—	—	125	—
Sprats, . . . . .	11	266	7,471	9,202
Whitebait . . . . .	579	584	1,543	1,603
Fish not separately distinguished, . . . . .	13,640	16,515	44,689	35,523
Total Wet Fish, . . . .	481,274	610,970	1,441,501	1,563,402
Shell Fish:—				
Crabs, . . . . .	706	2,516	1,715	3,843
Crawfish (Crayfish), . . . .	7	5	7	14
Lobsters, . . . . .	455	933	869	1,374
Oysters, . . . . .	12,396	10,874	38,645	31,027
Other Shell Fish, . . . . .	7,214	8,227	22,889	22,896
Total Shell Fish, . . . .	20,778	22,555	64,165	59,154
Total Value . . . . .	502,052	633,525	1,505,669	1,622,556

NOTE.—The figures for 1916 are subject to revision.

STATEMENT of the TOTAL QUANTITY of the FISH landed on the SCOTTISH COASTS during the Month and Three Months ended 31st March, 1916, compared with the corresponding periods of the year 1915.

KINDS OF FISH.	March.		Three Months ended 31st March	
	1916.	1915.	1916.	1915.
	Quantity			
	Cwts.	Cwts.	Cwts.	Cwts.
Herrings . . . . .	157,914	49,810	393,562	203,817
Sprats . . . . .	130	26	376	2,304
Sparlings . . . . .	5	3	74	106
Mackerel . . . . .	1,339	475	4,261	694
Cod and Codling . . . . .	64,105	76,620	116,653	148,540
Ling . . . . .	2,639	13,279	5,343	24,362
Torsk (Tusk) . . . . .	274	1,720	445	3,193
Saith (Coal Fish) . . . . .	8,042	19,524	21,753	60,629
Haddock . . . . .	32,471	43,891	87,441	109,775
Whitingss . . . . .	3,507	5,667	9,324	16,712
Conger Eels . . . . .	2,108	3,151	3,499	5,858
Gurnards . . . . .	670	364	1,525	837
Catfish . . . . .	940	2,961	2,185	5,426
Monks (Anglers) . . . . .	315	737	1,343	3,455
Hake . . . . .	784	1,024	1,415	2,566
Squids . . . . .	—	—	2	26
Turbot . . . . .	215	368	498	798
Halibut . . . . .	564	1,609	1,072	3,034
Lemon Soles . . . . .	1,153	2,354	3,116	5,824
Flounders . . . . .	180	229	736	743
Plaice . . . . .	2,542	3,627	7,094	8,456
Brill . . . . .	1	6	2	30
Dabs . . . . .	532	620	1,578	1,580
Witches . . . . .	166	270	513	868
Megrimms . . . . .	20	1,039	258	4,474
Skates and Rays . . . . .	3,880	12,119	9,117	22,689
Unclassified kinds . . . . .	424	369	1,057	842
<b>Totals</b>	<b>284,925</b>	<b>241,862</b>	<b>674,272</b>	<b>637,688</b>
<b>Shell Fish :—</b>	<b>No.</b>	<b>No.</b>	<b>No.</b>	<b>No.</b>
Crabs . . . . .	18,413	69,011	65,203	190,474
Lobsters . . . . .	24,942	32,232	61,529	94,390
Oysters . . . . .	50,400	57,200	140,314	159,704
<b>Clams . . . . .</b>	<b>Cwts.</b>	<b>Cwts.</b>	<b>Cwts.</b>	<b>Cwts.</b>
Clams . . . . .	19,855	1,237	20,696	2,468
Mussels . . . . .	8,949	8,241	26,261	33,162
Unclassified . . . . .	2,534	3,830	5,557	7,849

NOTE.—Landed by Foreign Vessels during the Three Months ended 31st March, 1916 (not included above), nil cwts.

The above figures are subject to correction in the Board's Annual Report.

STATEMENT of the TOTAL VALUE of the FISH landed on the SCOTTISH COASTS during the Month and Three Months ended 31st March, 1916, compared with the corresponding periods of the year 1915.

KINDS OF FISH.	March.		Three Months ended 31st March.	
	1916.	1915.	1916.	1915.
	Value			
	£	£	£	£
Herrings . . . . .	93,892	13,212	277,362	81,715
Sprats . . . . .	47	4	143	850
Sparlings . . . . .	22	17	237	254
Mackerel . . . . .	370	146	1,386	243
Cod and Codling . . . . .	66,380	60,970	148,936	135,519
Ling . . . . .	2,615	8,192	5,678	15,098
Torsk (Tusk) . . . . .	269	1,308	487	2,605
Saith (Coal Fish) . . . . .	4,356	8,113	10,148	22,193
Haddocks . . . . .	55,246	41,969	158,582	114,150
Whitings . . . . .	4,805	5,185	14,222	16,922
Conger Eels . . . . .	1,415	1,835	2,505	3,348
Gurnards . . . . .	237	106	596	314
Catfish . . . . .	684	1,392	1,730	2,639
Monks (Anglers) . . . . .	239	350	1,136	1,697
Hake . . . . .	1,632	1,787	2,972	4,868
Squids . . . . .	—	—	2	12
Turbot . . . . .	795	1,163	2,039	2,550
Halibut . . . . .	2,057	5,327	4,237	10,217
Lemon Soles . . . . .	5,574	8,607	15,057	21,622
Flounders . . . . .	269	243	1,146	760
Plaice . . . . .	6,026	6,221	16,667	15,485
Brill . . . . .	3	13	6	71
Dabs . . . . .	497	382	1,562	1,080
Witches . . . . .	511	549	1,738	1,891
Megrim . . . . .	66	2,714	912	10,642
Skates and Rays . . . . .	2,580	5,730	6,085	10,735
Unclassified kinds . . . . .	167	140	404	361
Totals . . . . .	250,754	175,675	676,225	477,841
Shell Fish :—	£	£	£	£
Crabs . . . . .	208	509	716	1,277
Lobsters . . . . .	1,540	1,721	4,046	5,262
Oysters . . . . .	184	232	548	646
Clams . . . . .	296	185	422	403
Mussels . . . . .	396	455	1,531	1,739
Unclassified . . . . .	800	1,000	1,610	1,972
Total Value . . . . .	3,424	4,102	8,873	11,299
Total Value of all Fish . . . . .	254,178	179,777	685,098	489,140

NOTE.—Landed by Foreign Vessels during the Three Months ended 31st March, 1916 (not included above), nil.

The above figures are subject to correction in the Board's Annual Report

STATEMENT of the TOTAL QUANTITY and VALUE of the FISH returned as landed on the IRISH COASTS during the Month and Three Months ended 31st March, 1916, compared with the corresponding periods of the Year 1915.

Kinds of Fish.	March		Three Months ended 31st March.	
	1916.	1915.	1916.	1915.
QUANTITY.				
	Cwt.	Cwt.	Cwt.	Cwt.
Brill. . . . .	39	27	79	77
Soles. . . . .	251	180	400	305
Turbot. . . . .	36	27	101	77
Total Prime Fish. . . . .	326	234	580	459
Cod. . . . .	3,792	3,461	6,092	6,436
Conger Eel. . . . .	291	288	553	634
Haddock. . . . .	159	350	742	888
Hake. . . . .	127	96	277	166
Herrings. . . . .	5,311	14,142	33,307	43,291
Ling. . . . .	177	223	300	522
Mackerel. . . . .	6,267	2,162	11,619	5,614
Plaice. . . . .	472	675	1,628	1,757
Ray or Skate. . . . .	688	673	1,449	1,663
Sprats. . . . .	40	—	578	38
Whiting. . . . .	1,828	490	5,128	1,589
All other except Shell Fish. . . . .	833	1,015	1,801	2,147
Total. . . . .	20,319	23,809	64,048	65,254
Shell Fish :—	No.	No.	No.	No.
Crabs. . . . .	—	198	—	198
Lobsters. . . . .	435	2,457	3,029	6,589
Mussels. . . . .	603	339	4,026	2,611
Oysters. . . . .	No.	No.	No.	No.
	21,030	20,544	76,194	75,594
Other Shell Fish. . . . .	Cwt.	Cwt.	Cwt.	Cwt.
	935	1,105	3,692	3,445
VALUE.				
	£	£	£	£
Brill. . . . .	177	58	363	229
Soles. . . . .	1,575	936	2,418	1,615
Turbot. . . . .	204	118	569	367
Total Prime Fish. . . . .	1,956	1,112	3,350	2,211
Cod. . . . .	4,409	2,619	8,192	5,844
Conger Eel. . . . .	276	198	540	616
Haddock. . . . .	167	318	801	869
Hake. . . . .	279	140	623	258
Herrings. . . . .	4,627	5,105	29,345	19,247
Ling. . . . .	135	208	334	475
Mackerel. . . . .	5,072	1,125	9,305	2,912
Plaice. . . . .	776	795	2,728	2,714
Ray or Skate. . . . .	448	237	986	719
Sprats. . . . .	20	—	181	10
Whiting. . . . .	2,185	456	7,103	1,649
All other except Shell Fish. . . . .	790	571	1,796	1,432
Total. . . . .	21,188	12,387	65,286	38,856
Shell Fish :—	No.	No.	No.	No.
Crabs. . . . .	—	1	—	1
Lobsters. . . . .	24	123	151	237
Mussels. . . . .	99	54	584	353
Oysters. . . . .	44	40	150	154
Other Shell Fish. . . . .	322	297	1,176	850
Total. . . . .	489	515	2,061	1,645
Total Value of Fish landed. . . . .	21,877	13,402	67,347	40,501

NOTE.—The above figures are subject to correction in Annual Returns.

# EMIGRATION FROM IRELAND.

TABLE showing, by Destinations, the Numbers of Emigrants (Natives of Ireland) who left the Ports of Ireland during the Months of January, February, and March, 1916, and the total for the Three Months ended the 31st March, 1916, together with the total Number of Emigrants in each of the corresponding periods of the year, 1915.

DESTINATION.	January, 1916.	February, 1916.	March, 1916.	Three Months ended 31st Mar., 1916.
<b>FOREIGN COUNTRIES AND THE COLONIES :—</b>				
America (U.S.), . . . . .	37	33	64	134
Canada, . . . . .	9	17	61	87
South Africa, . . . . .	—	1	2	3
Australia, . . . . .	2	5	18	25
New Zealand, . . . . .	1	—	4	5
Other Countries, . . . . .	1	—	3	4
<b>Total, . . . . .</b>	<b>50</b>	<b>56</b>	<b>152</b>	<b>258</b>
<b>GREAT BRITAIN :—</b>				
England and Wales, . . . . .	240	225	201	666
Scotland, . . . . .	68	88	93	249
<b>Total, . . . . .</b>	<b>308</b>	<b>313</b>	<b>294</b>	<b>915</b>
<b>General Total, 1916,</b>	<b>358</b>	<b>369</b>	<b>446</b>	<b>1,173</b>
<b>General Total, 1915,</b>	<b>366</b>	<b>319</b>	<b>404</b>	<b>1,089</b>

The figures in the above Table have been abstracted from the monthly Return published by the Registrar-General for Ireland.

*The figures are subject to revision in the Annual Report.*



MONTHLY AND QUARTERLY AVERAGE PRICES FOR IRELAND OF CROPS, LIVE STOCK, MEAT, PROVISIONS, &c., for the period ended 31st March, 1916.

PRODUCT.	MONTH.			QUARTER.	
	January	February	March	1916.	1915.
<b>CROPS :</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Wheat, .. per 112 lbs.	13 0	13 8	13 6	13 4	13 2
Oats (White), ..	9 11	10 4	10 7	10 3	9 11
„ (Black), ..	10 3	10 0	10 0	10 1	10 3
Barley, ..	12 10	13 2	14 1	13 5	—
Potatoes, ..	3 2½	3 5½	3 5½	3 4½	4 1½
Hay (Clover), ..	5 2	5 1½	5 8½	5 4½	4 6
„ (Meadow), ..	3 5½	3 6½	4 2½	3 9½	3 11½
Grass Seed—					
(Perennial Rye), ..	15 0	15 3	14 11	15 1	13 7
(Italian Rye), ..	—	—	—	—	—
Flax, .. per 14 lbs.	24 0	24 1	23 3	23 9	14 0
<b>LIVE STOCK :</b>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>
Calves (young), per head	3 1 0	3 5 6	3 16 9	3 10 3	2 10 9
<b>Store Cattle—</b>					
Over 6 and not exceeding 12 months, per head	7 0 0	7 7 6	8 3 6	7 13 9	6 5 0
One year old and under two years, per head	11 12 0	11 15 0	12 7 9	12 1 0	9 14 6
Two years old and under three years, per head	15 10 9	15 11 3	16 6 6	15 19 9	13 2 0
Three years old and over, per head	17 16 3	18 17 0	19 12 6	19 3 6	15 4 9
<b>Fat Cattle—</b>					
Two years old and under three years, per head	20 4 0	19 19 0	20 19 9	20 6 9	17 7 6
Three years old and over, per head	23 8 6	23 6 0	24 6 0	23 15 0	19 12 9
Cows and Bulls, ..	18 9 3	18 7 9	19 7 6	18 17 0	14 19 9
<b>Springers—</b>					
Cows and Heifers, ..	20 14 6	19 18 6	20 10 3	20 8 6	16 13 9
<b>Milch Cows (down calved)</b>					
per head	18 14 6	18 17 3	18 16 9	18 16 3	15 11 0
Lambs (under 12 months old), .. per head	2 4 3	2 7 6	2 6 9	2 6 3	1 19 6
<b>Store Sheep—</b>					
One year old and under two years, per head	2 4 6	2 9 9	2 10 9	2 10 0	2 2 0
Two years old and over, per head	2 6 3	2 3 6	2 7 3	2 5 0	1 17 9
<b>Fat Sheep—</b>					
One year old and under two years, per head	3 1 0	3 3 6	3 2 3	3 2 3	2 14 9
Two years old and over, per head	2 19 0	3 5 0	3 11 6	3 6 6	2 15 3
<b>Young Pigs—</b>					
8 to 10 weeks old, per head	1 14 9	1 15 9	1 17 6	1 16 3	1 3 6
<b>Store Pigs—</b>					
10 weeks to 4 months old, per head	2 2 9	2 6 0	2 6 6	2 5 3	1 16 3
4 months old and over, ..	2 13 0	2 17 0	2 15 6	2 15 0	2 4 0
<b>Fat Pigs, ..</b>	<b>5 8 6</b>	<b>5 13 9</b>	<b>6 15 0</b>	<b>6 3 9</b>	<b>5 15 9</b>
<b>Sows, ..</b>	<b>9 2 3</b>	<b>9 8 6</b>	<b>10 16 9</b>	<b>10 1 3</b>	<b>7 15 3</b>
<b>MEAT, PROVISIONS, &amp;c.</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Beef (Live), per 112 lbs.	46 3	47 9	51 0	48 3	44 9
„ (Dead), ..	81 0	83 6	89 3	84 6	78 3
Mutton (Live), ..	49 6	56 0	58 6	54 9	47 3
„ (Dead), ..	36 9	38 0	102 6	95 9	82 9
Pork (Dead), ..	80 0	83 9	86 0	83 3	64 6
Butter (Creamery), ..	158 0	159 6	151 6	155 6	140 6
„ (Farmers), ..	140 6	147 3	147 6	145 0	126 9
Eggs, .. per 120	17 10	14 7	13 3	14 8	12 5

QUARTERLY AVERAGE PRICES FOR EACH PROVINCE, OF CROPS, LIVE STOCK,  
MEAT, PROVISIONS, &c., for the Quarter ended 31st March, 1916.

PRODUCT.	PROVINCE.			
	Leinster.	Munster.	Ulster.	Connaught.
<b>CROPS:</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Wheat, .. per 112 lbs.	13 4	14 1	12 3	—
Oats (White), .. "	10 7	10 8	10 4	9 6
" (Black), .. "	10 0	10 3	10 11	—
Barley, .. "	13 5	12 8	—	—
Potatoes, .. "	4 0	4 0	2 11	3 4½
Hay (Clover), .. "	6 1½	4 9½	5 0½	4 1
" (Meadow), .. "	3 9	3 3	4 2	3 1½
Grass Seed—				
(Perennial Rye), .. "	—	—	15 1	—
(Italian Rye), .. "	—	—	—	—
Flax, .. per 14 lbs.	—	—	23 9	—
<b>LIVE STOCK:</b>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>
Calves (young) .. per head	3 7 9	2 15 6	2 7 9	4 9 3
Store Cattle—				
Over 6 and not exceeding 12 months, .. per head	7 14 0	7 14 6	7 5 9	7 19 9
One year old and under two years, .. per head	12 8 9	12 4 3	11 3 6	11 15 0
Two years old and under three years, per head	16 18 0	15 12 3	13 13 9	16 8 6
Three years old and over, per head	19 15 0	17 19 6	—	19 17 3
Fat Cattle—				
Two years old and under three years, per head	20 13 6	21 2 6	18 19 3	20 12 0
Three years old and over, per head	23 12 6	22 9 0	23 0 3	27 6 9
Cows and Bulls, .. "	21 12 3	17 19 0	18 12 9	23 18 0
Springers—				
Cows and Heifers, per head	20 16 3	19 18 9	19 11 6	22 0 9
Milch Cows (down calved), .. "	19 0 0	19 3 3	18 7 6	18 17 0
Lambs (under 12 months old) per head	2 6 3	2 8 6	—	2 1 0
Store Sheep—				
One year old and under two years, .. per head	2 9 0	2 11 6	—	2 8 9
Two years old and over, per head	2 5 3	—	—	—
Fat Sheep—				
One year old and under two years, per head	2 19 0	3 3 6	2 18 6	3 9 0
Two years old and over, .. "	3 3 9	3 12 6	2 17 6	3 11 3
Young Pigs—				
8 to 10 weeks old per head	1 11 9	—	1 18 0	2 0 3
Store Pigs—				
10 weeks to 4 months old, per head	2 8 9	2 1 3	2 9 3	—
4 months old and over, .. "	3 2 6	2 12 9	—	—
Fat Pigs, .. "	6 6 6	5 16 6	—	7 5 0
Sows, .. "	12 0 0	10 10 0	9 7 9	12 0 0
<b>MEAT, PROVISIONS, &amp;c.</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Beef (Live), .. per 112 lbs.	48 3	—	—	—
" (Dead), .. "	84 6	—	—	—
Mutton (Live), .. "	51 9	—	—	—
" (Dead), .. "	95 9	—	—	—
Pork (Dead), .. "	83 3	83 6	82 9	83 6
Butter (Creamery), .. "	149 6	160 0	—	—
" (Farmers), .. "	124 0	129 6	154 3	125 0
Eggs, .. per 120	15 6	13 7	14 6	14 1
Wool, .. per lb.	1 8½	1 3½	—	1 7½

NUMBER of ANIMALS included in Returns furnished under the MARKETS and FAIRS (Weighing of Cattle) Act, 1891, Sections 3 and 4,  
during the Quarter ended 31st March, 1916.

WEEK ENDED	FAT CATTLE.						FAT SHEEP.					
	Dublin.			Belfast.			Total Number of Cattle included in Returns.	Dublin.		Belfast.		
	Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.	Corporation Market Authorities.	Mr. John Robson, Auctioneer.	Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.		Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.	Corporation Market Authorities.		
1916.												
January	67	188	25	74	354	—	369	—	—	369	—	369
"	62	141	26	59	288	—	231	—	—	231	—	231
"	64	207	26	47	344	—	242	—	—	242	—	242
"	63	157	26	36	282	—	228	—	—	228	—	228
February	71	190	27	58	346	—	188	—	—	188	—	188
"	56	224	27	39	346	8	262	8	—	270	—	270
"	62	194	28	38	322	—	363	—	—	363	—	363
"	65	124	28	42	259	—	247	—	—	247	—	247
March	48	156	28	75	307	—	223	—	—	223	—	223
"	52	104	28	46	230	—	224	—	—	224	—	224
"	63	113	27	63	266	—	253	—	—	253	—	253
"	45	122	27	58	252	—	132	—	—	132	—	132
"	37	126	27	56	246	—	308	—	—	308	—	308
Totals.	755	2,046	350	691	3,842	8	3,270	8	—	3,278	—	3,278

WEEKLY AVERAGE PRICES of WHEAT, OATS, and BARLEY, per 112 lbs.  
computed from Market Returns of certain quantities of these Cereals  
supplied by Official Reporters of Prices, during the QUARTER ended  
31st March, 1916.

Returns received in the Week ended	WHEAT.		OATS.		BARLEY.	
	Average Price per 112 lbs.	Quantity.	Average Price per 112 lbs.	Quantity.	Average Price per 112 lbs.	Quantity
1916.	s. d.	Cwts. of 112 lbs.	s. d.	Cwts. of 112 lbs.	s. d.	Cwts. of 112 lbs.
January 8	12 7	2,125	9 7	21,056	12 1	88
" 15	12 7	917	10 2	16,238	11 7	244
" 22	13 8	1,959	10 2	19,860	13 3	840
" 29	13 1	2,024	10 2	22,425	12 10	1,730
February 5	13 8	1,607	10 0	20,221	13 4	940
" 12	13 5	1,518	10 1	14,476	14 0	160
" 19	13 6	761	10 5	18,206	12 4	860
" 26	14 0	1,406	10 5	15,846	13 9	600
March 4	13 4	1,031	10 7	16,454	14 4	740
" 11	13 0	752	10 9	14,419	14 2	820
" 18	14 2	774	10 6	12,350	13 9	750
" 25	13 6	595	10 3	13,716	14 3	630
April 1	13 9	475	10 2	12,157	14 1	450

QUARTERLY AVERAGE PRICES of FAT CATTLE and FAT SHEEP, per 112 lbs., LIVE  
WEIGHT, sold in DUBLIN MARKET during the period ended 31st  
March, 1916, and also for the corresponding period during nineteen  
preceding years.

Year.	Fat Cattle.			Fat Sheep.			Year.
	£	s.	d.	£	s.	d.	
1916,	2	8	3	2	14	9	1916.
1915,	2	4	9	2	7	3	1915.
1914,	1	15	0	2	5	9	1914.
1913,	1	16	1	2	2	0	1913.
1912,	1	16	3	1	17	4	1912.
1911,	1	13	4	1	17	6	1911.
1910,	1	13	8	1	19	6	1910.
1909,	1	13	2	1	12	2	1909.
1908,	1	12	9	2	0	0	1908.
1907,	1	12	0	2	3	2	1907.
1906,	1	10	11	2	2	6	1906.
1905,	1	11	5	1	19	9	1905.
1904,	1	10	9	1	19	7	1904.
1903,	1	13	10	2	1	1	1903.
1902,	1	12	6	1	14	8	1902.
1901,	1	12	5	1	16	10	1901.
1900,	1	13	2	1	17	5	1900.
1899,	1	11	8	1	14	1	1899.
1898,	1	9	9	1	16	10	1898.
1897,	1	11	4	1	17	0	1897.

## BUTTER PRICES DURING THE QUARTER

ABSTRACTED FROM "THE GROCER," "GROCER'S REVIEW."

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the  
 an Irish Creamery would be 5s. to 7s. per cwt. less than  
 freight, commission,

COUNTRY OF ORIGIN	Type of Package.	Place of Sale	WEEK ENDED			
			JANUARY.			
			1st.	8th.	15th.	22nd.
IRELAND— Creamery Butter.	Kieis, kegs, or pyramid boxes	London, . . .	Per cwt s. s.	Per cwt s. s.	Per cwt. s. s.	Per cwt s. s.
		Liverpool, . .	148-156	148-152	150-152	148-150
		Bristol, . . .	150-154	146-150	146-150	146-150
		Cardiff, . . .	150-154	140-150	140-145	—
		Manchester, . .	146-153	144-146	—	—
		Birmingham, .	—	—	—	—
		Glasgow, . . .	—	—	—	—
		Limerick, . . .	—	—	—	—
		Cork, . . . . .	—	—	—	—
		Belfast, . . .	—	—	—	—
	1lb. rolls, in boxes, Salted or Unsalted.	Dublin, . . . .	149/4-158/8	149/4-154	144/8-149/4	149/4-154
		F.O.R., . . . .	172/8	172/8	172/8	172/8
Factories,		London, . . . .	—	—	—	—
		Liverpool, . .	122-125	120-122	120-135	122-126
		Bristol, . . . .	130-136	128-136	128-136	128-136
		Cardiff, . . . .	130-134	125-130	120-130	125-135
Farmers' Butter,	Firkins 1st, Export Price Do. 2nd „ Do. 3rd „ Fresh, . . . .	Manchester, . .	—	—	—	—
		Cork, . . . . .	147	146	146	146
		Cork, . . . . .	109	—	98	109
		Cork, . . . . .	98-100	—	90-92	90-92
FRANCE,	12x2lb. rolls, Paris baskets.	London, . . . .	Per doz. lbs. 14/6-18/6	Per doz. lbs. —	Per doz. lbs. —	Per doz. lb 15/-19/-
		do., . . . . .	Per cwt. 153-162	Per cwt. —	Per cwt. —	Per cwt. 159-164
		—	—	—	—	—
DENMARK AND SWEDEN	Kieis, . . . . .	Copenhagen Quotation.	Kr. per 50 Kilos	—per 50 cwt. Kilos	Kr. per 50 Kilos	— per 50 cwt. Kilos
		Average over- price.	—	—	—	—
		London, . . . .	150-156	154-158	156-160	156-160
		Liverpool, . .	154-158	150-158	154-164	154-160
		Bristol, . . . .	—	—	—	—
		Cardiff, . . . .	155-160	168	168	162
		Manchester, . .	155-160	153-159	156-162	158-16
		Birmingham, .	156-160	154-156	158-161	161-16
		Newcastle-on- Tyne, . . . . .	153-157	150-157	153-163	156-16
		Glasgow, . . . .	164-166	152-154	158-160	160-16
	1lb. rolls, 10x24 lb. boxes.	Leith, . . . . .	156-158	156	155-158	160-16
		Hull, . . . . .	154-158	152-156	158-162	158-16
FINLAND	Kieis, . . . . .	F.O.R. Lon- don	—	—	—	—
		Manchester, . .	145-154	148-152	145-152	146-15
		Liverpool, . .	—	—	—	—
		Hull, . . . . .	145-150	—	—	144-14
		Cardiff, . . . .	153	148	153	153

ENDED 31ST MARCH, 1916.

## "GROCER'S GAZETTE," AND OTHER TRADE REPORTS.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

WEEK ENDED									
FEBRUARY.					MARCH.				
29th.	5th.	12th.	19th.	26th.	4th.	11th.	18th.	25th.	
Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	
144-146	—	—	—	—	—	—	—	—	
142-146	140-145	140-145	140	145	145-150	—	—	160	
—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	
144/8-149/4	144/8-149/4	144/8-149/4	151/8-154	154-158/8	158/8-163/4	158/8-163/4	158/8-163/4	158/8-163/4	
172/8	172/8	172/8	172/8	172/8	172/8	172/8	172/8	172/8	
—	—	—	—	—	—	—	—	—	
120-125	—	—	—	124	124	124	124	124	
130	130	130	130	130	130	130	130	130	
125-136	125-130	125-135	125-130	127	130	128	135	130	
—	—	—	—	—	—	—	—	—	
—	115-120	130	120	120	—	114-120	114	114-116	
90	90	90	90	90	90	93-95	95	—	
130-137	130-131	133	133	133	133-134	132-134	132-136	126-136	
Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	
14/6-18/6	14/6-18/6	14/6-18/6	14/6-18/6	14/6-18/6	14/6-18/6	14/6-18/6	14/6-18/6	14/6-18/6	
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	
153-158	153-160	153-160	153-160	153-160	153-160	153-160	153-160	153-160	
Kr. } per } 50 } cwt. } Kilos }	Kr. } per } 50 } cwt. } Kilos }	Kr. } per } 50 } cwt. } Kilos }	Kr. } per } 50 } cwt. } Kilos }	Kr. } per } 50 } cwt. } Kilos }	Kr. } per } 50 } cwt. } Kilos }	Kr. } per } 50 } cwt. } Kilos }	Kr. } per } 50 } cwt. } Kilos }	Kr. } per } 50 } cwt. } Kilos }	
156-158	156-158	158-162	164-168	172-176	178-182	180-184	180-182	176-180	
152-160	153-161	153-163	159-170	167-178	173-182	180-186	181-187	171-179	
—	—	—	—	—	—	—	—	—	
162	162	162	164-166	177	180	186	189	184	
154-160	156-160	158-162	164-168	170-175	176-182	180-186	181-185	173-181	
157-162	158-162	161-163	172-174	178-180	181-183	181-183	183-184	178-182	
152-156	153-159	155-164	160-174	168-178	173-182	179-182	177-181	170-177	
—	—	—	—	—	—	—	—	—	
160-162	154-156	156-158	160-164	164-168	173-176	178-180	180-184	180-181	
160	154-156	156	163	169	175	182	180-182	180	
156-159	154-158	158-162	160-165	168-174	173-177	176-180	176-180	175-178	
—	—	—	—	—	—	—	—	—	
142-148	144-148	140-146	140-150	156-158	154-158	156-158	145-160	156	
—	—	—	140	—	—	—	—	—	
140-150	149	148	148-152	—	149	149-152	—	150-152	

[Continued on pages 532 and 533.]

# **BUTTER PRICES DURING THE QUARTER** **ABSTRACTED FROM "THE GROCER," "GROCER'S REVIEW,"**

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the  
 an Irish Creamery would be 5s. to 7s. per cwt. less than  
 freight, commission,

COUNTRY OF ORIGIN.	Type of Package.	Place of Sale.	WEEK ENDED.			
			JANUARY			
			1st.	8th.	15th.	22nd.
RUSSIA AND SIBERIA,	Kiebs,	London,	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.
		Liverpool,	126-134	124-132	124-130	124-130
		Bristol,	122-134	120-134	120-132	120-132
		Cardiff,	128-142	130-142	130-142	130-140
		Manchester,	120-136	130	123	130
		Birmingham,	130-139	132-136	132-138	132-138
		Glasgow,	130	130	136	130
		Leith,	126-130	126-130	126-130	126-130
HOLLAND,	Boxes,	London,	120-130	130-135	125-130	125-130
		Hull,	—	—	—	—
	Rolls,	do.,	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
	Boxes,	Glasgow,—	Per cwt.	Per cwt.	Per cwt.	Per cwt.
		Fresh,	—	—	—	—
		Salt,	—	—	—	—
		Manchester,	—	—	—	—
		Hull,	—	—	—	—
ITALY,	Rolls,	London,	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
CANADA,	56 lb. Boxes,	London,	Per cwt.	Per cwt.	Per cwt.	Per cwt.
		Liverpool,	—	—	148	—
		Bristol,	—	149-152	150-152	—
		Cardiff,	—	—	146	—
		Birmingham,	—	—	—	—
		Manchester,	—	—	—	—
		Glasgow,	—	—	—	—
AUSTRALIA AND NEW ZEALAND,*	Boxes,	London,	A.s. 136-142	A.s. 140-146	A.s. 142-148	A.s. 138-146
		Liverpool,	u. 146-150	u. 150-154	u. 152-156	u. 154-158
		Bristol,	Z. 150-154	Z. 154-160	Z. 158-162	Z. 156-160
		Cardiff,	A. 140-150	A. 140-152	A. 146-153	A. 146-154
		Manchester,	Z. 146-154	Z. 146-154	Z. 153-158	Z. 150-154
		Birmingham,	A. 148-152	A. —	A. 148-152	A. 148-152
		Glasgow,	Z. 150-158	Z. 150-156	Z. 152-159	Z. 152-158
		Leith,	A. 148-150	A. 146-150	A. 150-152	A. 150-152
		Hull,	Z. 150-154	Z. 150-155	Z. 154-157	Z. 154-158
		London,	A. 148-152	A. —	A. 150-156	A. 146-150
		Liverpool,	Z. 150-158	Z. 148-154	Z. 152-158	Z. 152-156
		Bristol,	A. 148-150	A. 146-148	A. 148-150	A. 148-150
		Cardiff,	Z. 152-154	Z. 148-150	Z. 154-156	Z. 154-156
		Manchester,	A. 148	A. 148-150	A. 148-150	A. 148-150
		Birmingham,	Z. 154-156	Z. 150-152	Z. 150-158	Z. 148-150
		Glasgow,	A. —	A. —	A. —	A. 150
		Leith,	Z. —	Z. —	Z. —	Z. 154
		Hull,	A. —	A. —	A. —	A. —
		London,	Z. —	Z. 150-154	Z. 156-159	Z. 156-158
ARGENTINA,	Boxes,	London,	140-146	146-152	146-154	148-154
		Liverpool,	147-154	145-148	146-150	145-148
		Bristol,	—	—	—	—
		Cardiff,	—	140-150	—	152-154
		Manchester,	—	—	—	—
		Birmingham,	—	—	—	148-150
		Glasgow,	—	—	—	154-155
		Hull,	—	—	—	—
UNITED STATES,	Tubs and boxes,	London,	—	—	—	—
		Liverpool,	—	—	—	—
		Bristol,	136-152	136-146	136-146	136-146
		Cardiff,	136-145	136-145	—	137
		Manchester,	—	—	—	—

ENDED 31ST MARCH, 1916—Continued.

"GROCER'S GAZETTE," AND OTHER TRADE REPORTS.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

WEEK ENDED.

FEBRUARY					MARCH			
29th.	5th.	12th.	19th.	26th.	4th.	11th.	18th.	25th.
Per cwt. s. d.	Per cwt. s. d.	Per cwt. s. d.	Per cwt. s. d.	Per cwt. s. d.	Per cwt. s. d.	Per cwt. s. d.	Per cwt. s. d.	Per cwt. s. d.
124-130	124-130	124-130	124-130	124-130	126-134	126-134	126-134	126-134
120-132	124-133	124-132	123-132	123-132	120-134	123-135	120-135	120-135
126-140	128-140	128-140	125-140	125-140	130-140	130-140	130-140	130-140
130-134	130-134	125-135	125-135	135	120-133	125	135	130-135
130	130	130-134	130-132	130-134	120-134	126-136	126-136	130-132
126-130	126-130	126-130	126-130	126-130	126-130	126-130	126-130	126-130
125-130	120-130	120-130	120-124	120-130	120-130	120-130	120-130	120-130
Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
—	—	—	—	—	—	—	—	—
148-150	150-152	149-150	—	—	—	156-158	160	156-160
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
A.s. 140-146	A.s. 144-148	A.s. 146-148	A.s. 148-150	A.s. —	A.s. 156-160	A.s. 156-158	A.s. 156-158	A.s. —
u. 154-158	u. 156-160	u. 158-160	u. 158-160	u. —	u. 158-162	u. 158-162	u. 158-162	u. —
Z. 158-162	Z. 160-164	Z. 160-164	Z. 160-164	Z. 162-166	Z. 162-166	Z. 164-166	Z. 162-166	Z. 162-164
A. 144-152	A. 146-154	A. 146-154	A. 146-156	A. 150-156	A. 150-160	A. 150-163	A. 150-163	A. 150-162
Z. 146-154	Z. 150-156	Z. 152-160	Z. 153-160	Z. 159-166	Z. 163-168	Z. 164-168	Z. 165-168	Z. 165-168
A. 144-150	A. 144-150	A. 144-150	A. 146-152	A. 148-154	A. 156-160	A. 156-162	A. 156-162	A. 156-162
Z. 150-156	Z. 154-158	Z. 154-159	Z. 156-160	Z. 164-168	Z. 164-168	Z. 164-170	Z. 164-172	Z. 164-171
A. 146-152	A. 152-154	A. 150-152	A. 154-156	A. 156-160	A. 160-166	A. 164-165	A. 162-165	A. 162-164
Z. 152-156	Z. 154-158	Z. 154-158	Z. 156-160	Z. 162-164	Z. 166-170	Z. 166-170	Z. 166-170	Z. 164-173
A. 148-150	A. 146-148	A. 146-150	A. 152-156	A. 154-159	A. —	A. —	A. 160	A. —
Z. 148-153	Z. 150-155	Z. 152-156	Z. 154-160	Z. 160-163	Z. 164-168	Z. 165-169	Z. 166-170	Z. 166-169
A. 146-148	A. 146-148	A. 146-150	—	A. —	A. 154-158	A. 158-162	A. 160-164	A. 160-162
Z. 150-152	Z. 152-154	Z. 154-156	—	Z. 161-163	Z. 165-166	Z. 166-168	Z. 168-169	Z. 166-167
A. 150-152	A. 148-150	A. 148-150	A. 154-156	A. 155-158	A. 160-162	A. 162-164	A. 167-168	A. 164-165
Z. 154-156	Z. 154-155	Z. 154-155	Z. 158-160	Z. 161-163	Z. 166-168	Z. 168-170	Z. 168-171	Z. 166-168
A. 146	A. —	A. —	A. —	A. —	A. —	A. —	A. —	A. —
Z. 148-150	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —	Z. —
A. —	A. —	A. —	A. 153-156	A. 153-159	A. 156-159	A. 155-160	A. 158-162	A. 158-162
Z. —	Z. 152-156	Z. 156-168	Z. 157-160	Z. 160-165	Z. 163-166	Z. 163-166	Z. 166-168	Z. 167-169
146-152	150-152	150-152	152-156	154-158	154-158	154-158	154-160	154-158
144-146	145-148	145-160	148-150	150-154	151-157	156-160	156-160	155-160
138-145	150-154	—	154	156-158	164	—	163	—
142-144	—	—	—	152-154	154-156	156	—	—
146-148	146-148	146-160	—	152-154	—	—	—	—
154-155	154-155	150-152	156	157-158	160-162	162-164	—	—
142	140	135-140	130-140	128-142	128-144	130-140	130-140	130-140
136-140	—	—	138-140	135-140	128-150	130-146	—	—



AVERAGE RETAIL PRICES OF AGRICULTURAL SEEDS IN 42 IRISH TOWNS ON THE 1ST OF EACH OF THE MONTHS MARCH AND APRIL, 1916.

ROOTS AND GREEN CROPS.											
CORN CROPS.						ROOTS AND GREEN CROPS.					
Wheat.			Oats.			Barley.			Turnips.		Vetches.
Irish Grown.	Im-ported.	Per cwt.	Irish Grown.	Im-ported.	Per cwt.	Irish Grown.	Im-ported.	Per cwt.	Swede.	Aber-deen.	
Per cwt.	Per cwt.	s. d.	Per cwt.	Per cwt.	s. d.	Per cwt.	Per cwt.	s. d.	Per lb.	Per lb.	Per st.
Irish March	17 8	15 7	12 5	15 7	12 0	19 6	12 0	1 1	1 3	2 0	3 5
Irish April	18 10	16 0	12 3	16 0	16 4	19 9	16 4	1 1	1 4	2 0	3 6
Irish March	16 2	12 6	12 6	16 0	15 5	19 7	12 6	1 1	1 1	2 1	3 2
Irish April	17 0	12 6	12 8	16 2	16 0	20 6	15 5	1 1	1 0	2 1	3 3
Irish March	16 0	12 2	14 9	17 6	11 7	20 0	11 7	1 1	1 5	1 10	3 4
Irish April	20 0	12 2	15 4	—	11 7	21 1	11 7	1 2	1 2	2 5	3 3
Irish March	20 8	11 5	14 9	17 0	10 9	21 0	10 9	1 2	—	2 0	3 0
Irish April	22 0	11 7	15 5	18 0	11 2	22 2	11 2	1 2	1 2	2 7	3 2
Irish March	17 8	12 2	15 6	16 0	11 7	19 10	11 7	1 2	1 9	2 2	3 4
Irish April	19 8	12 5	15 10	16 6	12 5	20 7	12 5	1 1	1 2	2 9	3 4

AVERAGE RETAIL PRICES OF AGRICULTURAL SEEDS—continued.

GRASS SEEDS.											
PERENNIAL.						CLOVER SEEDS.					
28 lbs.			24 lbs.			22 lbs.			18 lbs.		
Per bushel.	Per bushel.	s. d.	Per bushel.	Per bushel.	s. d.	Per bushel.	Per bushel.	s. d.	Per bushel.	Per bushel.	s. d.
Irish March	7 7	6 11	6 4	7 9	7 1	6 2	6 8	6 2	6 2	6 2	6 2
Irish April	7 3	6 8	6 1	7 8	7 2	6 10	6 8	6 2	6 2	6 2	6 2
Irish March	6 11	6 1	5 8	7 2	6 10	6 10	6 0	6 0	6 0	6 0	6 0
Irish April	7 0	6 6	5 10	7 3	6 6	6 6	6 0	6 0	6 0	6 0	6 0
Irish March	6 2	5 5	5 4	6 11	6 2	5 8	5 8	5 8	5 8	5 8	5 8
Irish April	5 11	5 6	5 0	6 11	5 7	5 6	5 6	5 6	5 6	5 6	5 6
Irish March	6 6	6 3	6 1	6 11	6 5	6 5	6 0	6 0	6 0	6 0	6 0
Irish April	7 0	6 3	5 9	6 11	6 5	6 5	6 0	6 0	6 0	6 0	6 0
Irish March	6 10	6 3	5 9	7 1	6 8	6 8	6 1	6 1	6 1	6 1	6 1
Irish April	6 10	6 3	5 9	7 3	6 9	6 9	6 1	6 1	6 1	6 1	6 1

Statistics and Intelligence Branch,

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND, UPPER MERRION STREET, DUBLIN.

AVERAGE RETAIL PRICES PER CWT. OF FERTILISERS IN 42 IRISH TOWNS ON THE 1ST OF EACH OF THE MONTHS  
MARCH AND APRIL, 1916.

	Nitrate of Soda.	Sulphate of Ammonia.	Superphosphate.				Pure Dissolved Bones.	Basic Slag.		Agricultural Salt.
			Soluble Phosphate.					Soluble Phosphate.		
			35%	30%	26%	34%			28%	
Leinster	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
	18 5	19 11	4 11	4 3	4 4	4 9	4 4	4 2	4 5	2 5
Munster	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
	19 6	20 3	5 2	4 4	4 4	4 11	4 4	4 4	4 1	2 2
Ulster	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
	19 6	20 2	5 5	4 4	4 4	4 11	4 4	4 3	3 10	2 4
Connaught	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
	18 0	19 4	5 3	4 4	4 4	4 8	4 4	4 3	3 6	1 1
IRELAND	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
	20 0	20 11	5 2	5 0	4 4	4 10	4 4	4 4	4 4	2 2
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
	18 11	19 9	5 0	4 4	4 4	4 10	4 4	4 4	4 0	2 2
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
	19 5	20 2	5 4	4 4	4 9	4 11	4 4	4 4	4 1	2 4

*Statistics and Intelligence Branch,*

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERRION STREET, DUBLIN.

AVERAGE RETAIL PRICES PER CWT. OF FEEDING STUFFS IN 42 IRISH TOWNS ON THE 1ST OF EACH OF THE MONTHS JANUARY, FEBRUARY, MARCH AND APRIL, 1916.

CORN AND CORN OFFALS.										OILSEEDS AND THEIR PRODUCTS.											
Maize.			Bran.				Pollard or Sharps.			Middlings.		Linseed.				Cotton Seed.					
Whole Meal.			Red.		White.		Fine.		Coarse		Whole Meal.		Cake.		Decorated						
s.	d.	s.	d.	Broad.	Me- dum.	Broad.	Me- dum.	s.	d.	s.	d.	s.	d.	Home made	Amer- ican.	Meal.	Meal.	Cake.			
11	7	11	10	9	3	11	4	11	10	10	6	9	7	11	8	23	9	23	6	14	8
13	8	13	10	10	6	11	7	12	4	11	6	11	0	13	0	25	8	25	11	15	7
14	4	14	6	11	10	12	4	11	10	12	9	11	0	12	0	27	2	15	8	14	9
14	1	14	4	10	9	12	2	11	10	12	5	11	7	11	6	13	8	26	6	26	8
11	4	11	8	9	10	10	10	11	1	10	1	11	2	11	8	22	0	23	0	14	9
13	1	13	9	10	10	11	11	11	8	12	1	11	5	12	1	12	7	24	11	24	10
13	10	14	4	11	5	10	11	12	1	11	7	12	8	13	8	25	5	25	8	15	9
13	5	13	11	11	2	10	8	12	0	11	5	12	4	13	0	26	0	26	1	15	6
11	4	11	7	10	1	9	8	11	9	10	10	11	6	11	3	22	4	22	10	14	6
12	11	13	3	11	1	11	0	12	4	11	2	13	3	12	5	24	5	24	15	15	4
13	7	13	10	11	5	11	2	12	3	11	6	12	7	11	9	12	1	13	4	14	8
13	9	13	10	11	7	11	3	12	6	11	11	12	8	11	8	12	9	13	10	25	9
12	1	11	8	10	8	10	4	11	10	11	3	12	4	11	5	24	6	23	4	14	8
13	4	13	10	11	6	10	9	12	2	11	3	12	9	11	9	10	6	24	4	24	9
14	2	14	4	11	6	11	2	12	7	11	11	13	3	12	4	27	1	27	1	15	11
14	0	14	4	11	10	11	8	13	0	12	0	13	0	12	6	26	4	27	2	15	10
11	7	11	8	10	1	9	8	11	3	10	8	11	6	23	0	23	2	14	8	13	11
13	3	13	8	11	0	10	10	12	0	11	6	12	4	11	5	24	11	25	2	15	5
13	11	14	3	11	4	10	10	12	4	11	10	12	9	11	10	26	4	27	1	14	10
13	8	14	1	11	2	10	10	12	5	11	7	12	5	11	7	26	5	26	2	15	3

RETURN of the NUMBER of HORSES EXPORTED from IRELAND through GREAT BRITAIN to the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 31ST MARCH, 1916, showing the Ports of Embarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast, . . . . .	—	—	—	—
Cork, . . . . .	—	—	—	—
Dublin, . . . . .	1	1	—	2
Dundalk, . . . . .	—	—	—	—
Greenore, . . . . .	—	—	—	—
Waterford, . . . . .	—	—	—	—
Wexford, . . . . .	—	—	—	—
Total, . . . . .	1	1	—	2

RETURN of the NUMBER of HORSES IMPORTED into IRELAND through GREAT BRITAIN from the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 31ST MARCH, 1916, showing the Ports of Debarcation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast, . . . . .	—	—	—	—
Dublin, . . . . .	—	—	—	—
Total, . . . . .	—	—	—	—

RETURN of the NUMBER of HORSES EXPORTED from IRELAND direct to FOREIGN COUNTRIES during the THREE MONTHS ended 31ST MARCH, 1916, showing the Ports of Embarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Cork, . . . . .	—	—	—	—
Limerick, . . . . .	—	—	—	—
Total, . . . . .	—	—	—	—

# TABLES SHOWING THE EXPORTS

## TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT  
the PORTS OF EMBARKATION

PORTS IN IRELAND.	CATTLE.							SHEEP.			
	Fat.	Stores (fatten- ing).	Milch Cows.	Spring- ers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ballina. . .	74	—	—	—	33	—	107	—	—	—	—
Belfast. . .	6,312	15,262	2,239	—	430	51	24,294	828	—	—	828
Cork. . .	5,562	6,721	944	—	—	744	13,971	2,851	1,319	—	4,170
Drogheda. . .	7,660	58	282	—	—	—	8,000	1,393	—	—	1,393
Dublin. . .	50,880	16,116	3,901	—	337	320	71,554	32,749	—	—	32,749
Dundalk. . .	9,378	1,341	54	—	346	—	11,119	1,420	—	—	1,420
Greenore. . .	213	961	289	—	—	—	1,463	124	—	—	124
Larne. . .	862	5,314	17	—	—	364	6,587	28	—	—	28
Limerick. . .	—	—	—	—	—	—	—	—	—	—	—
Londonderry. . .	6,317	7,647	203	—	459	453	15,079	2,234	—	—	2,234
Milford. . .	—	—	—	—	—	—	—	—	—	—	—
Mulroy. . .	—	—	—	—	—	—	—	—	—	—	—
Newry. . .	477	320	3	—	—	—	800	361	—	—	361
Portrush. . .	—	—	—	—	—	—	—	—	—	—	—
Sligo. . .	250	37	—	—	—	—	287	130	—	—	130
Waterford. . .	11,313	6,328	1	15	346	267	18,270	4,610	—	—	4,610
Westport. . .	14	—	—	—	4	—	18	—	—	—	—
<b>TOTAL.</b>	<b>99,312</b>	<b>60,135</b>	<b>7,933</b>	<b>15</b>	<b>1,955</b>	<b>2,199</b>	<b>171,549</b>	<b>46,728</b>	<b>1,319</b>	<b>—</b>	<b>48,047</b>

## TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT  
the PORTS OF DEBARKATION

PORTS IN GREAT BRITAIN.	CATTLE.							SHEEP.			
	Fat.	Stores (fatten- ing).	Milch Cows.	Spring- ers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ardrassan. . .	—	—	—	—	—	—	—	—	—	—	—
Ayr. . .	1,233	10,320	182	—	5	11	11,651	73	—	—	73
Bristol. . .	493	1,813	—	—	—	40	2,348	776	—	—	776
Embsay. . .	2,163	5,532	783	15	—	635	9,128	2,165	1,319	—	3,484
Fleetwood. . .	1,471	863	460	—	39	—	2,853	783	—	—	783
Glasgow. . .	10,616	7,850	2,020	—	1,215	810	22,541	183	—	—	183
Greenock. . .	976	3,851	—	—	—	—	4,827	—	—	—	—
Hersham. . .	4,377	9,558	1,674	—	4	—	16,113	5,158	—	—	5,158
Holyhead. . .	21,127	8,462	1,976	—	—	47	31,612	10,731	—	—	10,731
Liverpool. . .	53,552	7,223	829	—	692	303	62,599	25,352	—	—	25,352
London. . .	—	—	—	—	—	—	—	—	—	—	—
Manchester. . .	1,731	—	—	—	—	—	1,731	1,463	—	—	1,463
Plymouth. . .	—	—	—	—	—	—	—	—	—	—	—
Preston. . .	178	—	9	—	—	—	187	44	—	—	44
Slith. . .	190	81	—	—	—	—	271	—	—	—	—
Southampton. . .	—	—	—	—	—	—	—	—	—	—	—
Stranraer. . .	673	4,682	—	—	—	353	5,708	—	—	—	—
<b>TOTAL.</b>	<b>99,312</b>	<b>60,135</b>	<b>7,933</b>	<b>15</b>	<b>1,955</b>	<b>2,199</b>	<b>171,549</b>	<b>46,728</b>	<b>1,319</b>	<b>—</b>	<b>48,047</b>

# AND IMPORTS OF ANIMALS.

## I.

BRITAIN during the Three Months ended 31st MARCH, 1916, showing  
IN IRELAND.

SWINE.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN IRELAND.
Fat.	Stores.	Total.		Stal- lions.	Mares.	Geld- ings.	Total.				
35	—	35	—	—	—	—	—	—	—	142	Ballina.
1,604	1,696	3,300	1	—	139	334	473	—	3	23,899	Belfast.
5,275	—	5,275	—	3	21	32	56	—	1	23,473	Cork.
603	121	724	4	—	—	1	1	—	—	10,122	Drogheda.
30,410	—	30,410	7	21	253	175	449	—	2	135,171	Dublin.
3,566	90	3,656	690	—	12	6	18	—	—	16,903	Dundalk.
—	—	—	3	—	33	35	68	—	—	1,653	Greenore.
—	983	983	—	—	9	15	24	—	—	7,622	Larne.
—	—	—	—	—	—	—	—	—	—	—	Limerick.
769	—	769	—	—	11	12	23	—	—	18,105	Londonderry.
—	—	—	—	—	—	—	—	—	—	—	Milford.
—	—	—	—	—	—	—	—	—	—	—	Mulroy.
212	—	212	41	—	—	—	—	—	—	1,414	Newry.
—	—	—	—	—	—	—	—	—	—	—	Portrush.
2,270	—	2,270	4	—	—	—	—	—	—	2,691	Sligo.
14,157	—	14,157	—	—	7	15	22	—	—	37,059	Waterford.
—	—	—	—	—	—	—	—	—	—	18	Westport
58,901	2,890	61,791	750	24	485	625	1,134	—	6	283,277	TOTAL.

## II.

BRITAIN during the Three Months ended 31st MARCH, 1916, showing  
IN GREAT BRITAIN.

SWINE.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN GREAT BRITAIN.
Fat.	Stores.	Total.		Stal- lions.	Mares.	Geld- ings.	Total.				
1,284	—	—	—	—	46	150	196	—	—	196	Ardrossan.
1,694	1,694	2,978	—	—	14	31	45	—	—	14,747	Ayr.
2,619	—	2,619	—	—	3	4	7	—	—	5,750	Bristol.
11,919	—	11,919	—	3	9	16	28	—	—	24,659	Fishguard.
—	2	2	1	—	38	63	101	—	1	3,721	Fleetwood.
2,153	—	2,153	3	1	51	107	159	—	1	25,040	Glasgow.
—59	—	—59	—	—	1	—	—	—	—	4,887	Greenock.
3,010	—	3,010	—	—	22	48	70	—	1	24,552	Heysham.
26,344	—	26,344	7	20	262	158	440	—	2	69,136	Holyhead.
11,078	211	11,289	739	—	28	26	54	—	—	100,033	Liverpool.
—	—	—	—	—	—	—	—	—	—	—	London.
3	—	3	—	—	—	—	—	—	—	3,197	Manchester.
—	—	—	—	—	—	1	1	—	1	2	Plymouth.
199	—	199	—	—	1	1	2	—	—	432	Preston.
233	—	233	—	—	—	1	1	—	—	505	Slough.
—	—	—	—	—	1	4	5	—	—	5	Southampton.
—	983	983	—	—	9	15	24	—	—	6,715	Stranraer.
58,901	2,890	61,791	750	24	485	625	1,134	—	6	283,277	TOTAL.

TABLE

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from GREAT  
the PORTS OF

PORTS IN IRELAND.	CATTLE.							SHEEP.			
	Fat.	Stores.	Milch Cows.	Spring- ers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ballina, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Belfast, . . . . .	—	—	—	—	62	—	62	534	72	—	606
Coleraine, . . . . .	—	—	—	—	14	—	14	—	—	—	—
Cork, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Drogheda, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Dublin, . . . . .	—	52	—	—	—	—	52	—	7	—	7
Dundalk, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Greenore, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Larne, . . . . .	—	12	1	1	—	—	14	89	—	—	89
Limerick, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Londonderry, . . . . .	—	10	—	—	—	—	10	—	—	—	—
Millford, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Mulroy, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Newry, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Portrush, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Silgo, . . . . .	—	—	—	—	1	—	1	—	—	—	—
Waterford, . . . . .	—	2	—	—	—	—	2	—	—	—	—
Westport, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Wexford, . . . . .	—	—	—	—	—	—	—	—	—	—	—
TOTAL, . . . . .	—	76	1	1	77	—	155	623	79	—	702

TABLE

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from GREAT  
the PORTS OF EMBARKATION

PORTS IN GREAT BRITAIN.	CATTLE.							SHEEP.			
	Fat.	Stores.	Milch Cows.	Spring- ers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ardrossan, . . . . .	—	—	—	—	54	—	54	163	—	—	163
Ayr, . . . . .	—	—	—	—	1	—	1	460	72	—	532
Barrow, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Bristol, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Cardiff, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Falmouth, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Fishguard, . . . . .	—	1	—	—	13	—	14	—	—	—	—
Fleetwood, . . . . .	—	—	—	—	2	—	2	—	—	—	—
Glasgow, . . . . .	—	45	—	—	3	—	48	—	—	—	—
Greenock, . . . . .	—	2	—	—	—	—	2	—	—	—	—
Heysham, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Holyhead, . . . . .	—	16	—	—	—	—	16	—	7	—	7
Liverpool, . . . . .	—	—	—	—	4	—	4	—	—	—	—
London, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Manchester, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Newhaven, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Plymouth, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Preston, . . . . .	—	—	—	—	—	—	—	—	—	—	—
St. Helier, . . . . .	—	—	—	—	—	—	—	—	—	—	—
St. James, . . . . .	—	—	—	—	—	—	—	—	—	—	—
Swansea, . . . . .	—	12	1	1	—	—	14	—	—	—	—
TOTAL, . . . . .	—	76	1	1	77	—	155	623	79	—	702

## III.

BRITAIN during the Three Months ended 31st MARCH, 1916, showing  
DEBARKATION IN IRELAND.

PIGS.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN IRELAND.
Fat.	Stores.	Total.		Stal- lions.	Mares.	Geld- ings.	Total.				
—	—	—	1	11	19	25	55	—	—	724	Ballina.
—	—	—	—	15	32	11	58	—	—	72	Belfast.
—	—	—	—	—	—	—	—	—	—	—	Coleraine.
—	—	—	—	—	—	—	—	—	—	—	Cork.
—	3	3	—	46	100	55	201	—	—	263	Drogheda.
—	—	—	—	1	3	—	4	—	—	4	Dublin.
—	—	—	—	12	14	18	44	—	—	44	Dundalk.
—	—	—	2	12	11	8	31	—	—	136	Greenore.
—	—	—	—	—	—	—	—	—	—	—	Larne.
—	—	—	—	—	—	—	—	—	—	—	Limerick.
—	3	3	—	6	8	4	18	—	—	31	Londonderry.
—	—	—	—	—	—	—	—	—	—	—	Millford.
—	—	—	—	—	1	—	1	—	—	1	Mulroy.
—	—	—	—	—	—	—	—	—	—	—	Newry.
—	—	—	—	—	—	—	—	—	—	—	Portrush.
—	—	—	—	—	—	—	—	—	—	—	Sligo.
—	—	—	—	1	13	34	48	—	—	50	Waterford.
—	—	—	—	—	—	—	—	—	—	—	Westport.
—	—	—	—	—	—	—	—	—	—	—	Wexford.
—	6	6	3	104	201	155	460	—	—	1,326	TOTAL.

## IV.

BRITAIN during the Three Months ended 31st MARCH, 1916, showing  
IN GREAT BRITAIN.

PIGS.			Goats.	HORSES.				Mules or Jen etc	Asses.	Total Animals	PORTS IN GREAT BRITAIN.
Fat.	Stores.	Total.		Stal- lions.	Mares.	Geld- ings.	Total.				
—	—	—	—	2	—	2	4	—	—	221	Ardrossan.
—	—	—	—	5	9	8	22	—	—	555	Ayr.
—	—	—	—	—	8	—	32	—	—	32	Barrow.
—	—	—	—	—	—	—	—	—	—	—	Bristol.
—	—	—	—	—	—	—	—	—	—	—	Cardiff.
—	—	—	—	12	34	20	66	—	—	80	Falmouth.
—	—	—	—	1	1	5	6	—	—	8	Fishguard.
—	6	6	—	13	21	18	52	—	—	106	Fleetwood.
—	—	—	—	1	1	2	4	—	—	6	Glasgow.
—	—	—	1	1	5	2	8	—	—	9	Greenock.
—	—	—	—	54	107	67	228	—	—	251	Heysham.
—	—	—	—	4	7	—	11	—	—	15	Holyhead.
—	—	—	—	—	—	—	—	—	—	—	Liverpool.
—	—	—	—	—	—	—	—	—	—	—	Londo.
—	—	—	—	—	—	—	—	—	—	—	Manchester.
—	—	—	—	—	1	1	2	—	—	2	Newhaven.
—	—	—	—	—	—	—	—	—	—	—	Plymouth.
—	—	—	—	—	—	—	—	—	—	—	Preston.
—	—	—	—	—	—	—	—	—	—	—	Silloth.
—	—	—	2	12	7	6	25	—	—	41	Southampton.
—	—	—	—	—	—	—	—	—	—	—	Stranraer.
—	—	—	—	—	—	—	—	—	—	—	Swansea.
—	6	6	3	104	201	155	460	—	—	1,326	TOTAL.



RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the  
showing the PORTS of

PORT IN IRELAND.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
BELFAST, .	—	—	—	—	—	—	—	—
DUBLIN, .	46	—	—	—	46	109	—	109
TOTAL, .	46	—	—	—	46	109	—	109

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the  
showing the PORTS of DEBARKATION

PORT IN ISLE OF MAN.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
DOUGLAS, .	46	—	—	—	46	109	—	109

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the  
showing the PORTS of

PORT IN IRELAND.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
BELFAST, .	—	—	—	—	—	—	—	—
DUBLIN, .	—	—	—	—	—	—	—	—
TOTAL, .	—	—	—	—	—	—	—	—

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the  
showing the PORTS of EMBARKATION

PORT IN ISLE OF MAN.	CATTLE					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
DOUGLAS, .	—	—	—	—	—	—	—	—

ISLE OF MAN during the Three Months ended 31st March, 1916,  
EMBARKATION in IRELAND.

SWINE.			Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	PORT IN IRELAND.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	—	—	—	—	—	—	BELFAST.
										155	DUBLIN.
—	—	—	—	—	—	—	—	—	—	155	TOTAL

ISLE OF MAN during the Three Months ended 31st March, 1916,  
in the ISLE OF MAN.

SWINE.			Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	PORT IN ISLE OF MAN.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—			—	—	—	—	—	155	DOUGLAS.

ISLE OF MAN during the Three Months ended 31st March, 1916,  
DEBARKATION in IRELAND.

SWINE.			Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	PORT IN IRELAND.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	—	—	—	—	—	—	—	—	—	—	BELFAST. DUBLIN.
—	—	—		—	—	—	—	—	—	—	TOTAL.

ISLE OF MAN during the Three Months ended 31st March, 1916,  
in the ISLE OF MAN.

[illegible]

## COASTING AND

RETURN OF THE NUMBER OF ANIMALS SHIPPED to and from Places in  
the Places of Embarkation

IRISH PORTS.	CATTLE.					SHEEP.			SWINE.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.	Fat.	Stores.	Total.
Cork to Aghada Pier, .	—	—	—	—	—	—	—	—	—	—	—
" to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
" to Spike Island, .	—	—	—	—	—	—	—	—	—	—	—
" to Queenstown, .	—	—	—	—	—	—	—	—	—	—	—
" to Waterford, .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	—	—	—	—	—	—	—	—	—	—
Aghada Pier to Cork, .	—	—	—	—	—	—	—	—	—	—	—
Belfast " .	—	—	—	—	—	—	—	—	—	—	—
Spike Island " .	—	—	—	—	—	—	—	—	—	—	—
Queenstown " .	—	—	—	—	—	—	—	—	—	—	—
Waterford " .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	—	—	—	—	—	—	—	—	—	—
Waterford to Ballyhack, .	—	59	—	10	69	—	—	—	—	4	4
" to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
" to Duncannon .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	59	—	10	69	—	—	—	—	4	4
Ballyhack to Waterford, .	145	4	—	—	149	33	—	33	187	—	187
Dublin to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
Duncannon to Waterford, .	26	—	—	—	26	—	—	—	24	—	24
Kilrush to Limerick, .	—	—	20	—	20	—	—	—	231	—	231
Kildysart " .	—	—	—	—	—	—	—	—	—	—	—
Glin, " .	—	—	—	—	—	—	—	—	—	—	—
Portumna, " .	—	—	—	—	—	—	—	—	—	—	—
Tarbert, " .	—	—	—	—	—	—	—	—	49	—	49
Kilkeo, " .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	—	20	—	20	—	—	—	280	—	280
Milford to Portrush, .	—	—	—	—	—	—	—	—	—	—	—
Larne to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
Londonderry to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Moville to Londonderry, .	2	9	—	—	11	—	—	—	—	—	—
Ballina to Sligo, .	—	—	—	—	—	—	—	—	—	—	—
Belmullet " .	27	—	—	—	27	—	—	—	727	—	727
Westport " .	—	—	—	—	—	—	—	—	—	—	—
Total, .	27	—	—	—	27	—	—	—	727	—	727
Sligo to Belmullet, .	—	—	—	—	—	—	—	—	—	—	—
Milford to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Mulroy to Portrush, .	—	—	—	—	—	—	—	—	—	—	—
Dublin to Waterford, .	—	—	—	—	—	—	—	—	—	—	—
Lisbeg to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Total, .	200	72	20	10	302	33	—	33	1,218	4	1,222

## INLAND NAVIGATION.

Ireland during the Three Months ended 31st MARCH, 1916, showing  
and Debarkation

Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	IRISH PORTS.
	Stallions.	Mares.	Geldings.	Total.				
—	—	—	—	—	—	—	—	Cork to Aghada Pier.
—	—	—	—	—	—	—	—	"  to Belfast.
—	—	—	—	—	—	—	—	"  to Spike Island.
—	—	—	—	—	—	—	—	"  to Queenstown.
—	—	—	—	—	—	—	—	"  to Waterford.
—	—	—	—	—	—	—	—	Total.
—	—	—	—	—	—	—	—	Aghada Pier to Cork.
—	—	—	—	—	—	—	—	Belfast " "
—	—	—	—	—	—	—	—	Spike Island " "
—	—	—	—	—	—	—	—	Queenstown " "
—	—	—	—	—	—	—	—	Waterford " "
—	—	—	—	—	—	—	—	Total.
—	—	—	2	2	—	—	75	Waterford to Ballyhack.
—	—	—	—	—	—	—	—	"  to Belfast.
—	—	—	—	—	—	—	—	"  to Duncannon.
—	—	—	2	2	—	—	75	Total.
—	—	1	—	1	—	—	370	Ballyhack to Waterford.
—	—	—	—	—	—	—	—	Dublin to Belfast.
—	—	—	—	—	—	—	50	Duncannon to Waterford.
—	—	—	—	—	—	—	251	Kilrush to Limerick.
—	—	—	—	—	—	—	—	Kildysart " "
—	—	—	—	—	—	—	—	Glin " "
—	—	—	—	—	—	—	—	Portumna " "
—	—	—	—	—	—	—	49	Tarbert " "
—	—	—	—	—	—	—	—	Kilkee " "
—	—	—	—	—	—	—	300	Total.
—	—	—	—	—	—	—	—	Milford to Portrush.
—	—	—	—	—	—	—	—	Larne to Belfast.
—	—	—	—	—	—	—	—	Londonderry to Mulroy.
—	—	—	—	—	—	—	11	Moville to Londonderry.
—	—	—	—	—	—	—	—	Ballina to Sligo.
—	—	—	—	—	—	—	754	Belmullet " "
—	—	—	—	—	—	—	—	Westport " "
—	—	—	—	—	—	—	754	Total.
—	—	—	—	—	—	—	—	Sligo to Belmullet.
—	—	—	—	—	—	—	—	Milford to Mulroy.
—	—	—	—	—	—	—	—	Mulroy to Portrush.
—	—	—	—	—	—	—	—	Dublin to Waterford.
—	—	—	—	—	—	—	—	Leitbeg to Mulroy.
—	—	1	2	3	—	—	1,560	Total

ACCOUNT showing the QUANTITIES of certain kinds of AGRICULTURAL  
into Ireland during each WEEK

ARTICLES	WEEK ENDED				
	1st January	8th January	15th January	22nd January	29th January
ANIMALS LIVING—					
Horses, . . . . No.	—	—	—	—	—
FRESH MEAT—					
Beef (including refrigerated and frozen), . . . cwt.	—	—	—	—	—
Mutton, . . . . "	—	—	—	—	—
Pork, . . . . "	—	—	—	—	—
Unenumerated . . . "	—	—	—	—	—
SALTED OR PRESERVED MEAT—					
Bacon, . . . . cwt.	—	—	—	—	—
Beef, . . . . "	—	—	—	—	—
Hams, . . . . "	—	—	—	—	—
Pork, . . . . "	—	—	—	—	—
Meat, unenumerated, Salted . .	—	—	—	—	—
Meat, preserved otherwise than by salting (including tinned and canned), . . . cwt.	—	—	—	—	—
DAIRY PRODUCE AND SUBSTITUTES—					
Butter, . . . . cwt.	—	—	—	—	—
Margarine, . . . . "	—	—	—	—	—
Cheese, . . . . "	—	—	—	—	—
Milk, Condensed, . . . "	82	46	—	—	63
" Cream, . . . . "	—	—	—	—	—
" Preserved, other kinds . .	—	—	—	—	—
EGGS, . . . . gt. hunds.	—	—	—	—	—
LARD, . . . . cwt.	—	—	—	—	—
CORN, GRAIN, MEAL AND FLOUR—					
Wheat, . . . . cwt.	136,900	34,300	48,900	108,500	167,000
Wheat Meal and Flour, . . .	39,500	8,700	9,100	—	4,100
Barley, . . . . "	—	—	—	—	—
Oats, . . . . "	—	—	—	—	—
Peas, . . . . "	—	—	—	—	—
Beans, . . . . "	—	—	—	—	—
Maize, or Indian Corn, . . .	78,500	20,500	176,800	278,000	9,700
FRUIT, RAW—					
Apples, . . . . "	—	—	—	—	—
Bananas, . . . . bunches	—	—	—	—	—
Currants, . . . . cwt.	—	—	—	—	—
Gooseberries, . . . . "	—	—	—	—	—
Pears, . . . . "	—	—	—	—	—
Plums, . . . . "	—	—	—	—	—
Grapes, . . . . "	—	—	—	—	—
Lemons, . . . . "	—	—	—	—	—
Oranges, . . . . "	—	—	—	—	—
Strawberries, . . . . "	—	—	—	—	—
Unenumerated, . . . . "	—	—	—	—	—
HAY, . . . . tons,	—	—	—	—	—
STRAW, . . . . "	—	—	—	—	—
MOSS LITTER, . . . . "	—	—	—	—	—
HOPS, . . . . cwt.	—	—	—	—	—
VEGETABLES, RAW—					
Onions, . . . . bushels,	—	—	—	—	—
Potatoes, . . . . cwt.	—	—	—	—	560
Tomatoes, . . . . "	—	—	—	—	—
Unenumerated, . . . value £	—	—	—	—	—
VEGETABLES, DRIED, . . . cwt.	—	—	—	—	—
Preserved by Canning, . . . "	—	—	—	—	—
POULTRY AND GAME, . . value £	—	—	—	—	—

\* This Table is confined to the Imports of certain kinds of Agricultural Produce into a request from this Department kindly consented to separate the Irish Imports (direct) form of Weekly Returns.

PRODUCE imported direct (i.e., from the Colonies and Foreign Countries)  
January, February, and March, 1916.\*

[illegible]

Ireland from the Colonies and Foreign Countries. The Board of Customs have in answer from those of the United Kingdom, and to supply this Department with them in the

Statistics and Intelligence Branch,  
Department of Agriculture  
and Technical Instruction for Ireland.

## DISEASES OF ANIMALS IN IRELAND.

NUMBER OF OUTBREAKS of SWINE FEVER, and NUMBER of SWINE returned as having been SLAUGHTERED in Ireland, under the Diseases of Animals Act of 1894, in the undermentioned period, by Order of the Department.

Quarter ended	SWINE FEVER.	
	Outbreaks confirmed.	Swine Slaughtered as Diseased or as having been Exposed to Infection.
31st March, 1916, . . . . .	75	385

NUMBER of OUTBREAKS reported as having taken place, and NUMBER of ANIMALS returned as having been Attacked by ANTHRAX, GLANDERS and FOOT AND MOUTH DISEASE in Ireland in the undermentioned period.

Quarter ended	ANTHRAX.		GLANDERS (including Farcy).		Foot and Mouth Disease.	
	Outbreaks Reported	Animals Attacked.	Outbreaks Reported.	Animals Attacked.	Outbreaks Reported.	Animals Attacked.
31st Mar., 1916,	—	—	—	—	—	—

NUMBER of CASES of RABIES in DOGS in IRELAND during the undermentioned period.

Quarter ended	Number of Cases.
31st March, 1916, . . . . .	—

NUMBER of OUTBREAKS reported as having taken place, and NUMBER of ANIMALS returned as having been attacked by SHEEP-SCAB and PARASITIC-MANGE in Ireland in the undermentioned period.

Quarter ended	SHEEP-SCAB.		PARASITIC-MANGE.	
	Outbreaks Reported.	Sheep Attacked.	Outbreaks Reported.	Animals Attacked.
31st Mar., 1916,	168	1,348	24	44

Veterinary Branch,  
Department of Agriculture and Technical Instruction  
for Ireland, Dublin.

Vol. XVI.

[OFFICIAL COPY.]

No. 4.

DEPARTMENT OF AGRICULTURE  
AND  
TECHNICAL INSTRUCTION FOR IRELAND.

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JOURNAL.

The Council of Agriculture—The Vice-President's Address—Investigations on Potato Diseases—Fisheries (Ireland) Acts relating to Mills and Factories—Maize Products—"Chambrage" in Oysters—Irish Minerals and Raw Materials; Opportunities for Development—Crop Report—Fruit Crop Report—Potato Blight in Ireland—Fourth Irish Egg-Laying Competition—Official Documents—Notes and Memoranda—Statistical Tables.

SIXTEENTH YEAR

No. 4

JULY, 1916.



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1916.



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## NOTICE.

*Communications respecting the literary contents of this JOURNAL  
should be addressed to the Superintendent of the Statistics and  
Intelligence Branch, Department of Agriculture and Technical  
Instruction for Ireland, Upper Merrion Street, Dublin.*

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LONDON, W.C., and not to the DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND.*

## THE COUNCIL OF AGRICULTURE.

The Twenty-ninth Meeting of the Council of Agriculture took place on Thursday, 25th May, 1916, in the Lecture Theatre of the Royal Dublin Society, Leinster House, Kildare Street, Dublin (by kind permission of the Council of the Society).

The Chair was taken at 11 a.m. by the Right Hon. T. W. Russell, P.C., M.P., Vice-President of the Department.

The following were present :—

### REPRESENTING THE DEPARTMENT.

The Vice-President; T. P. Gill, Secretary; J. R. Campbell, B.Sc., Assistant Secretary in respect of Agriculture; George Fletcher, F.G.S., Assistant Secretary in respect of Technical Instruction; J. S. Gordon, B.Sc., Deputy Assistant Secretary in respect of Agriculture and Chief Agricultural Inspector; H. G. Smith, M.A., LL.D., Chief Clerk; Thomas Butler, Superintendent of the Statistics and Intelligence Branch; J. P. Walsh, Clerk in Charge of Accounts; J. V. Coyle, B.L., Senior Staff Officer; F. J. Meyrick, M.A.; W. Bowers, and M. Deegan.

### MEMBERS OF COUNCIL, ACCORDING TO PROVINCES.

#### *Leinster.*

Algernon T. F. Briscoe, J.P.; John Butler, J.P.; Patrick J. Carey, J.P.; Denis J. Cogan; Joseph Dolan; Robert Downes; Michael Dunne, J.P.; Colonel Sir Nugent T. Everard, Bart., H.M.L.; James P. Farrell, M.P.; William Field, M.P.; Rev. T. A. Finlay, M.A.; Hugh Garahan, J.P.; Patrick Hanlon; Patrick J. Kennedy, J.P.; James M'Carthy, J.P.; Patrick J. O'Neill, J.P.; Laurence H. Reynolds; William R. Ronaldson, J.P.; Hugh Wallace.

#### *Ulster.*

William Bailie; Hugh T. Barrie, J.P., D.L., M.P.; R. N. Boyd; Anthony Cassidy, J.P.; Alexander L. Clark, J.P.; Frederick C. Cowdy; Joseph Davison; J. Hill Dickson, J.P.; Edward Gallagher, J.P., D.L.; John Keenan, J.P.; Thomas Macafee, J.P.; John S. F. M'Cance, J.P., D.L.; Thomas A. M'Clure, J.P.; T. P. M'Kenna, J.P.; H. de F. Montgomery, J.P., D.L.; George Murnaghan, J.P.; Colonel R. G. Sharman-Crawford, J.P., D.L., M.P.; Michael Shiels, J.P.; Alfred H. Sinton; Thomas Toal, J.P.

#### *Munster.*

John Bourke; Edmund Cummins, J.P.; Thomas Duggan, J.P.; Joseph Dwyer, J.P.; William M'Donald, J.P.; Michael Mescal, J.P.; Michael J. Nolan, J.P.; Patrick O'Connell, J.P.; David Leo O'Gorman, J.P.; James O'Regan, J.P.; Hugh P. Ryan; Timothy Sheehan, J.P.; Michael Slattery, J.P.; James Willington, J.P.

*Connacht.*

Patrick D. Conroy, J.P. ; P. J. Costello, J.P. ; Rev. Joseph G. Digges, M.A. ; John Galvin ; John Lohan ; James P. MacGuire, J.P. ; Rev. P. J. Manly, P.P. ; Daniel Morrin, J.P. ; Rev. Philip J. Mulligan, P.P. ; Robert P. Wallace, J.P.

Mr. J. V. Coyle acted as Secretary to the Meeting.

The Minutes of the twenty-eighth Meeting, 16th November, 1915, a copy of which had been sent to each member of the Council, were taken as read, and were signed as correct.

Apologies for inability to attend the Meeting were received from the Right Hon. Lord Clonbrock, K.P., H.M.L. ; Mr. Peter Ffrench, M.P. ; Mr. William R. Gubbins, J.P. ; Mr. Nicholas B. King, J.P. ; and Mr. George F. Murphy, J.P.

Mr. J. P. Farrell, M.P., asked leave to submit a resolution on a matter of urgent importance at the present time, arising out of the recent rebellion in Dublin.

The Vice-President stated that on the ground of lack of notice alone he could decline to receive Mr. Farrell's motion. He ruled, however, that the question raised in the proposed resolution was not one for the Department, as it did not affect the agricultural interests of the country.

The Vice-President delivered his address (see pp. 558 *et seq.*).

The Council proceeded to consider the question of "the Registration of Cart Sires," which was submitted by the Department for discussion, together with a Summary of the recommendations in the matter made by the Advisory Committee on Horse Breeding.

The following resolution, standing in the name of Mr. M. J. Horan, J.P. (King's County), was proposed by Mr. William Field, M.P., and seconded by Mr. James Willington, J.P. (County Tipperary) :—

"That we hereby call on the Department to allow the registration of Draught Horses or of two more Clydesdale Stallions for King's County."

By desire of the Vice-President the Assistant Secretary in respect of Agriculture dealt with a number of points in a memorandum on the Horse Breeding Schemes which the Department had prepared for the meeting, and called attention to the views of the War Office authorities, recorded therein, which were unfavourable to both Clydesdale and Shire Horses.

After some discussion the following amendment was proposed by Mr. William R. Ronaldson, J.P. (Co. Kildare), and seconded by Mr. Patrick J. O'Neill, J.P. (Co. Dublin) :—

"That it be left to each County Committee to select the breed of horse to be subsidized in their County."

Mr. James O'Regan, J.P. (Co. Clare) proposed, and

Mr. Michael Slattery, J.P., seconded the following amendment to the foregoing :—

“That this Council approves and adopts the findings of the Department's Advisory Committee on Horse Breeding.”

A lengthy debate ensued and ultimately Mr. O'Regan's amendment was put to the Meeting.

On a division there voted :—

For the amendment	27
Against	29
Majority	2

The voting on the amendment was as follows :—

#### FOR.

*Leinster* :—John Butler, J.P.; Col. Sir N. T. Everard, Bart.; Laurence H. Reynolds. *Ulster* :—H. T. Barrie, D.L., M.P.; A. L. Clark, J.P.; F. C. Cowdy; Jos. Davison; J. Hill Dickson, J.P.; Thos. Macafee, J.P.; J. S. F. M'Cance, J.P., D.L.; H. de F. Montgomery, D.L.; Col. R. G. Sharman-Crawford, D.L., M.P. *Munster* :—John Burke; Edmund Cummins, J.P.; Wm. M'Donald, J.P.; D. L. O'Gorman, J.P.; James O'Regan, J.P.; H. P. Ryan; M. Slattery, J.P. *Connacht* :—P. J. Costello, J.P.; Rev. J. G. Digges, M.A.; John Lohan; J. P. MacGuire, J.P.; Rev. P. J. Manly, P.P.; Danl. Morrin, J.P.; Rev. P. J. Mulligan, P.P.; R. P. Wallace—(27).

#### AGAINST.

*Leinster* :—P. J. Carey, J.P.; D. J. Cogan; Jos. Dolan; R. Downes; M. Dunne, J.P.; Jas. P. Farrell, M.P.; Hugh Garahan, J.P.; P. J. Kennedy, J.P.; Jas. McCarthy, J.P.; P. J. O'Neill, J.P.; W. R. Ronaldson, J.P.; Hugh Wallace. *Ulster* :—Wm. Bailie; R. N. Boyd; A. Cassidy, J.P.; E. Gallagher, J.P., D.L.; T. A. McClure, J.P.; T. P. McKenna, J.P.; Geo. Murnaghan, J.P.; A. H. Sinton; Thos. Toal, J.P. *Munster* :—Thos. Duggan, J.P.; Jos. Dwyer, J.P.; M. Mescal, J.P.; P. O'Connell, J.P.; T. Sheehy, J.P.; James Willington, J.P. *Connacht* :—P. D. Conroy, J.P.; John Galvin—(29).

Mr. Patrick Hanlon, Mr. John Keenan, J.P., and Mr. Michael Shiels, J.P., did not vote.

Mr. Ronaldson's amendment was then put. On a division there voted :—

For the amendment	31
Against	25
Majority for	6

The voting on this amendment was as follows :—

#### FOR.

*Leinster* :—P. J. Carey, J.P.; D. J. Cogan; Jos. Dolan; R. Downes; M. Dunne, J.P.; Jas. P. Farrell, M.P.; Hugh Garahan, J.P.; P. J.

Kennedy, J.P.; P. J. O'Neill, J.P.; W. R. Ronaldson, J.P.; Hugh Wallace. *Ulster*:—W. Bailie; R. N. Boyd; A. Cassidy, J.P.; E. Gallagher, J.P., D.L.; J. Keenan, J.P.; T. A. M'Clure, J.P.; T. P. M'Kenna, J.P.; G. Murnaghan, J.P.; M. Shiels, J.P.; A. H. Sinton; T. Toal, J.P. *Munster*:—T. Duggan, J.P.; J. Dwyer, J.P.; M. Mescal, J.P.; P. O'Connell, J.P.; T. Sheehy, J.P. *Connacht*:—P. D. Conroy, J.P.; J. Galvin; J. Lohan; D. Morrin, J.P.—(31).

#### AGAINST.

*Leinster*:—John Butler, J.P.; Col. Sir N. T. Everard, Bart.; L. H. Reynolds. *Ulster*:—H. T. Barrie, D.L., M.P.; A. L. Clark, J.P.; F. C. Cowdy; J. Davison; J. Hill Dickson, J.P.; T. Macafee, J.P.; J. S. F. M'Cance, J.P., D.L.; Col. R. G. Sharman-Crawford, D.L., M.P. *Munster*:—J. Bourke; E. Cummins, J.P.; W. M'Donald, J.P.; D. L. O'Gorman, J.P.; J. O'Regan, J.P.; H. P. Ryan; M. Slattery, J.P.; Jas. Willington, J.P. *Connacht*:—P. J. Costello, J.P.; Rev. J. G. Digges, M.A.; J. P. MacGuire, J.P.; Rev. P. J. Manly, P.P.; Rev. P. J. Mulligan, P.P.; R. P. Wallace, J.P.—(25).

Mr. Patrick Hanlon did not vote.

The Vice-President stated that the resolution standing in Mr. Horan's name would be submitted by the Department at the next meeting of the Agricultural Board, who would deal with the matter in the light of the action taken by the Council.

Mr. William Field, M.P., drew attention to the need for legislation with a view to requiring that all sires standing for public service should be registered. He urged that the question of licensing bulls should not be overlooked when stallions were being considered.

Mr. Campbell referred to the Bill for the Licensing of Stallions, which had been approved by the Council at their meeting on 4th December, 1912, and subsequently introduced in the House of Commons by the Vice-President. This Bill had to be dropped at the end of the Session. The Board of Agriculture and Fisheries had recently prepared for Great Britain a Bill modelled on the Department's original Bill, and that Board were awaiting a favourable opportunity to introduce it into Parliament. The Department desired that the Bill should apply to Ireland, provided certain amendments, which he detailed, were made for this country.

After a brief discussion the Council agreed with the action which the Department proposed to take in this matter.

The Department submitted for discussion the question of the sale of oil-extracted maize.

Mr. Campbell made a statement as to the attitude of the Department in the matter, which was set out fully in a memorandum printed for the information of the Council.\*

After some discussion the Vice-President stated that the several suggestions made would receive careful consideration.

\* See article at page 607.

The following matters submitted by the Department for discussion were then considered, viz. :—

The administration of (1) the Black Scab in Potatoes (Ireland) Orders; (2) the American Gooseberry Mildew and Black Currant Mite (Ireland) Order; (3) the Sheep Dipping Orders; and (4) Part II. (Agricultural Seeds) of the Weeds and Agricultural Seeds (Ireland) Act, 1909.

Mr. Campbell explained the procedure followed by the Department in connection with Black Scab, Gooseberry Mildew and Agricultural Seeds. He drew special attention to the Orders dealing with Black Scab in Potatoes and mentioned that the Department might at an early date have to consider whether the importation into Ireland of seed potatoes from Great Britain should not be permitted except under licence.

After considerable discussion the following resolution was proposed by Mr. William Field, M.P., and seconded by Mr. James Willington, J.P. :—

“That the Council of Agriculture desires to support the measures taken by the Department for the administration of the Orders dealing with Black Scab in Potatoes, American Gooseberry Mildew, and Sheep Scab and of Part II. of the Weeds and Agricultural Seeds Act.”

Mr. Michael Mescal, J.P. (Co. Clare), proposed and Mr. Patrick J. Kennedy, J.P. (Co. Meath), seconded the following amendment with regard to Sheep Scab :—

“That we earnestly request the Department of Agriculture to withdraw the Sheep Dipping (Appointment of Inspectors) Order immediately, as we see no necessity whatever for the imposition of the Order and the heavy expenses it entails on Counties having a clean bill of health as regards Sheep Scab, or in the alternative to suspend the Order during the War for the same reasons that influenced the Department in the case of the Tuberculosis (Ireland) Order of 1914, viz., the conservation of public funds in this time of financial depression. We consider the imposition of such fresh taxes wholly unreasonable and unwarranted during the war.”

The Vice-President suggested the omission from the resolution of the reference to Sheep Scab, which could then be taken by itself.

This suggestion was accepted by the proposer and seconder of the resolution, which was accordingly adopted in the following form unanimously by the Council :—

“That the Council of Agriculture desires to support the measures taken by the Department for the administration of the Orders dealing with Black Scab in Potatoes and American Gooseberry Mildew and of Part II. of the Weeds and Agricultural Seeds Act.”

The Council then resumed the debate on the Sheep Dipping Orders.

Mr. Prentice submitted a memorandum\* as to sheep dipping in Ireland (especially with regard to the Sheep Dipping (Appointment of Inspectors) Order of 1915) which had been prepared by the Department for the information of County Councils in Ireland, with a view to removing certain misapprehensions which had arisen in the country.

The following resolution was proposed by Mr. William Field, M.P., and seconded by Mr. James Willington, J.P. :—

“That this Council desires to support the action taken by the Department for the administration of the Orders dealing with Sheep Scab.”

A protracted debate ensued, in the course of which some members advocated an extension of the period prescribed for summer dipping.

Eventually the question was put. On a division there voted :—

For the resolution	. . . . .	18
Against	. . . . .	8
		—
Majority for	. . . . .	10

The voting was as follows :—

#### For.

*Leinster* :—Michael Dunne, J.P. ; William Field, M.P. *Ulster* :—R. N. Boyd ; Anthony Cassidy, J.P. ; E. Gallagher, J.P., D.L. ; John Keenan, J.P. ; Thomas Macafee, J.P. ; T. P. McKenna, J.P. ; H. de F. Montgomery, J.P., D.L. ; Michael Shiels, J.P. ; Thomas Toal, J.P. *Munster* :—Edmund Cummins, J.P. ; Joseph Dwyer, J.P. ; David L. O’Gorman, J.P. ; Hugh P. Ryan ; James Willington, J.P. *Connacht* :—Patrick D. Conroy, J.P. ; Rev. P. J. Manly, P.P.—(18).

#### AGAINST.

*Leinster* :—Denis J. Cogan ; Hugh Garahan, J.P. ; P. J. Kennedy, J.P. *Munster* :—John Bourke ; Thomas Duggan, J.P. ; Michael Mescal, J.P. ; James O’Regan, J.P. ; Michael Slattery, J.P.—(8).

Mr. Anthony Cassidy, J.P. (Co. Cavan), proposed, and Mr. T. P. McKenna, J.P. (Co. Cavan), seconded the following resolution :—

“That with a view to encouraging the growth of wheat the Department should give grants for backward districts, in order to secure suitable milling facilities for residents in such districts.”

It was suggested (Mr. Campbell) that the word “loans” should be substituted for the word “grants” in the resolution.

The suggestion was accepted by the proposer and seconder, and the resolution as thus amended was passed unanimously.

In reference to the following motions which stood in the name of Mr. William Field, M.P. :—

\* See copy printed at page 663.

"(1) To call attention to the condition of the live stock loading banks on some of the Irish railways ;

"(2) That the Department should consider the advisability of proposing legislation to compel the Irish Railway Companies to adopt a system of compulsory insurance for all live stock, and a minimum rate of speed for all trains conveying live stock ;

"(3) That this meeting is of opinion that the Department should take the necessary steps to render possible by law the punishment of those cattle owners who neglect to carry out the preventive measures recommended for the destruction of the warble fly " ;

the Vice-President explained that until the War was over the Department were not prepared to take any action with regard to (1) and (2). As to (3) the Department had not yet completed their investigations and until these investigations had been concluded, it was not possible to consider the question of compulsion.

Mr. Campbell made a brief statement as to the present state of the Department's Warble Fly investigation.

Mr. David L. O'Gorman, J.P. (Co. Cork), proposed, and Mr. Thomas Macafee, J.P. (Co. Antrim), seconded the following resolution :—

"That in the opinion of this Council the Summer Time Act is not suited to Ireland, as it disorganises long-established hours of labour, renders dairying and agriculture more difficult and, if persisted in, will most certainly lead to a decrease in both, and, whilst a direct punishment to farmers, who were already early risers, and of no advantage to shopkeepers in towns, we ask that it be at once repealed."

The Vice-President pointed out that the Act was in the nature of an experiment which would be worked out in a few months when the matter would have to be considered again. He suggested that the Council should take no action at the present time.

The Council agreed to the Vice-President's suggestion.

The following notice of motion standing on the Agenda paper in the name of Mr. Alex. L. Clark, J.P. (Co. Londonderry), was postponed at the request of Mr. Clark :—

"To call attention to certain Imports and Exports in the recently issued Report on the Trade in Imports and Exports at Irish ports during the year ended 31st December, 1914, and to consider the possibility of establishing and developing industries in Ireland."

On the motion of Mr. William Field, M.P., seconded by Mr. James Willington, J.P., a vote of thanks to the Vice-President was adopted unanimously.

The proceedings terminated at 5.25 p.m.



## THE VICE-PRESIDENT'S ADDRESS.

GENTLEMEN,

This ordinary meeting of the Council of Agriculture was summoned originally for an earlier date, but had to be postponed owing to the great calamity which has befallen the country. It takes place, however, within the normal period, and I am glad it has been found possible for the Council to assemble in these grave and perilous times to perform duties which, always of great importance, were never more so than at the present juncture.

### THE INSURRECTION AND THE FARMING COMMUNITY.

In the midst of abounding agricultural prosperity Ireland has been overtaken by an insurrection or, as some people choose to call it, a rebellion, which has left a mark that will not easily be effaced. It is no part of my official duty, as I understand it, to discuss this, one of the gravest incidents of our time. But there is one thing which I think ought to be said from the chair of this Council. The trouble was not of an agrarian character. In no part of the country, save perhaps the district of Athenry in the West, do the farmers as a class appear to have any connection with the insurrection. I mention this fact not only in order to place the situation in its true proportions, but to bring out the welcome evidence which the fact conveys, that the land legislation of the past has not entirely missed its mark.

Before passing from this infinitely painful subject, I would urge upon farmers everywhere that they will best serve the country by getting back to the normal as quickly as possible, and by bending all their energies to the work of food production, which is of such real and vital importance to the nation.

I do not propose to address you at any length, but there are one or two matters on the agenda paper in regard to which I think a few words of explanation are called for.

### THE IRISH HORSE BREEDING INDUSTRY.

There is, for instance, the question of the horse breeding industry. This question claims immediate attention. The encouragement of the breeds of light as opposed to heavy horses has long been a matter of contention in this country. Heavy horses are what I may call privileged animals in Ulster, and in some restricted portions of the other provinces. Elsewhere they have, up to the present, received little or no consideration. In the work of framing and developing a national horse breeding policy, the Department have been aided and guided by the best available expert opinion. The policy hitherto followed has received the approval of the Advisory Committee on Horse Breeding, of this Council, and of the Agricultural Board. But the war now raging has thrown a

good deal of light upon many points connected with horse breeding that have been warmly disputed from time to time. The Department have, therefore, considered it necessary to review the whole position with a view to providing for future developments. To this end a meeting of the Advisory Committee on Horse Breeding, which represents the whole country and is composed of experts, and experts alone, was held a few days ago. The findings of the Committee will be submitted for consideration to-day, and it will be for the Council to decide as to the recommendations which ought to be made to the Agricultural Board in this connection. I need say nothing to press upon the Council the extreme importance of safeguarding our great horse breeding industry.

#### SEED TESTING.

There has been a development in connection with the administration of the seeds section of the Weeds and Agricultural Seeds (Ireland) Act which I feel it advisable to mention. The Council are aware that the Department have worked this Act with great clemency. The powers of publication conferred by the Act constituted an entirely new feature in the legislation of these islands. The Department recognised that the Act was bound to effect a revolution in the conduct of the Irish seed trade, and that that trade should be given an opportunity of adapting its methods to the new conditions. The names and addresses, together with the results of the tests of samples taken on their premises, were recently published in the case of over ninety traders who were found to have been stocking inferior seeds last year. Publication was first made by means of a list circulated among all retail seed traders in Ireland, and subsequently by means of posters displayed in the towns in which the traders in question carried on business. None of those whose names were published could reasonably complain that resort was had to the power of publication without ample notice having been given to all concerned.

I must refer in some detail to the case of one trader who was subjected to this system of publication. This trader took exception to the Department's system of seed testing, contrasting it unfavourably with what is known as the "continental" system, and suggested that sealed duplicates of the samples taken should in each instance be left with the trader by the Official Samplers. He did not, however, confine his action to communicating with the Department on the subject, but appears to have issued a circular to all the other traders whose names had been published, suggesting that they should take concerted action. Indeed a few of these traders refused to give samples unless they were furnished with duplicates of any that were taken. Some cases of a similar nature have occurred in the past; but this year, from communications

which have reached the Department, and from an article in a provincial paper, there would seem to be a tendency on the part of one or two traders to seek to lay down the conditions under which they will comply with the law. There is no statutory provision requiring the Department to give duplicate samples, nor are they at present prepared to undertake any obligation of the kind. It has, however, always been the practice of the Department, if so requested, to supply to traders, from the Seed Testing Station, portions of any particular samples taken on their premises; and this practice will be continued. But I wish to take this public opportunity of warning those traders who are inclined to resist the due enforcement of the Weeds and Seeds Act, that any refusal to permit samples to be taken by the Department's officers will lead to their prosecution. The adoption of any other procedure would only result in wrecking the administration of an Act which was designed solely for the farmers' protection and benefit, and which is vitally essential to the satisfactory development of the agricultural industry.

#### BLACK SCAB IN POTATOES.

The Council will be asked to consider the present position regarding Black Scab in Potatoes. This disease is not found anywhere in Ireland save in two small isolated areas in County Down, which roughly comprise the immediate neighbourhood of Kilkeel and the southern portion of the Ards peninsula. On its first appearance in the country some eight or nine years ago, the Department took prompt measures under the Black Scab in Potatoes (Ireland) Order, 1908, with a view to its arrest and eradication. In accordance with the provisions of that Order all diseased tubers were burned under the supervision of the Department's Inspector, and arrangements were made for disposing of the remainder of the crop in a suitable manner. In addition, the occupiers of the land on which the disease was found were prevented from planting it again with potatoes. This procedure continues to be followed in every case of the disease that occurs in the affected districts.

As, however, the disease continued to re-appear annually, the Department came to the conclusion that it could be coped with satisfactorily only by means of an Order constituting certain areas "scheduled districts," out of which potatoes could not be moved without a licence or certificate to be granted by the Department. This provision was designed to safeguard the rest of the country. It was further provided that potatoes could not be planted on any land covered by the Order until at least five years had elapsed since the ground was previously cropped with potatoes. There can be no doubt that the too frequent cropping of the same land with potatoes is one of the main causes of the disease.

These restrictions have on the whole been calmly, if not always willingly, submitted to. Those upon whom they have been imposed are, of course, consulting their own interests in thus co-operating with the Department, as there is imminent danger of their customers refusing to take further supplies from them unless it is evident that the disease is being vigorously suppressed and every possible step taken to prevent the sale of infected potatoes.

The presence of Black Scab in these two limited areas in County Down was the original reason for the exclusion of Irish potatoes from the United States, and but for it Irish growers would probably be free to export their surplus stock to that country. Having regard to the injury caused to the potato crop by the disease, and the necessity of preserving our export trade in this class of produce, I need hardly emphasize the importance to the rest of Ireland of seeing that the Black Scab Orders are properly enforced. I say this because a limited number of farmers in the "scheduled districts" have, this season, in spite of most explicit warnings to the contrary, planted potatoes on land which had been so cropped within the last five years. The information before the Department indicates that this action was taken not in ignorance, but in deliberate defiance of the regulations. The question, therefore, which the Department have to consider is whether these farmers are to be allowed to persist in their infringement of the law and to thwart measures which, as I have explained, were adopted in the interests of the entire country.

#### AMERICAN GOOSEBERRY MILDEW.

The administration of the American Gooseberry Mildew and Black Currant Mite (Ireland) Order, 1912, is also among the subjects submitted by the Department for discussion. I may say that this Order deals with two of the most injurious and infectious pests known to the fruit-growing industry. It requires any person whose bushes are infected to notify the existence of the disease; and diseased bushes are, upon inspection, required to be destroyed. The results of experiments carried out by the Department indicate that the destruction of infected bushes is the only effective means of controlling these pests wherever they secure a foothold.

No serious objection has been made to this method of treatment in the case of the Black Currant Mite, but some opposition has recently been raised to the requirements of the Department in regard to American Gooseberry Mildew. It has been stated that affected bushes in the County Armagh have recovered from the disease. Let me say that such an occurrence would be entirely contrary to the knowledge and experience of the experts employed by the Department. On all the available data it can only be assumed that the disease is not curable.

I would, therefore, submit that the question is whether the interests of the country as a whole would be better served by continuing the present policy of destroying infected bushes than by allowing the disease a practically free course, with the inevitable ruin of gooseberry growing in this country. Take the operation of the Order in the Armagh district, where the disease is, unfortunately, widely prevalent. Out of 34,000 bushes in that county inspected by one of the Department's Horticultural Inspectors during the twelve months ended 1st March, 1916, some 7,000 were condemned. This, no doubt, operated hardly on the fruit-growers concerned. But what was the alternative? In this rigorous treatment lay the only chance of saving the healthy bushes in County Armagh, and of preventing the unchecked spread of American Gooseberry Mildew to other districts, where, so far, no case of the disease has been notified to the Department.

And there is another very important consideration which must not be overlooked. What would be the effect of relaxing the control of this disease upon our export trade in plants to the United States, to which country a very considerable quantity of nursery stock and farm plants is exported from Ireland? It would be harmful in the extreme. The proceedings at the Phytopathological Conference held in Rome in 1914, at which the Department were represented, as well as the United States Plant Quarantine Act of 1912 and other similar enactments, indicate that the existing tendency in most countries is towards the stricter control of plant diseases. It is certain, therefore, that those countries which fail in this respect will run the risk of being placed under serious disabilities in maintaining their export trade in nursery stock and other such commodities. The Department have, moreover, been fortified in enforcing the American Gooseberry Mildew and Black Currant Mite Orders by the fact that, under the Destructive Insects and Pests Acts, it is within the competence of County Councils to arrange for the payment of compensation from the local rates to persons whose bushes are destroyed in compliance with notices served under the Orders. Such an arrangement is, in my opinion, only fair and equitable, seeing that the loss inflicted upon the individual in such cases tells for the good of the general community. A few County Councils have already recognised this obligation on their part, and the opposition which the Department's Orders has evoked would be largely minimised if other local authorities would only go and do likewise.

#### FOOD PRODUCTION.

I must say a few words in conclusion regarding the question of food production. The Council are aware that the Department have devoted continued and unceasing attention to this matter. As a result of these efforts there was an increase last year in the

case of almost every crop grown in the country. The addition to our ploughed land within that period amounted to over 80,000 acres. All things considered, this was a gratifying step in the right direction. At the last meeting of the Council I described the Food Production Campaign which was then being conducted by the Department. I stated that a large number of public meetings had been held in connexion with the Campaign at selected centres throughout the four provinces, that the Press was cordially co-operating in the movement, that posters urging the farmers to undertake more tillage and to breed more live stock and poultry were being displayed throughout the length and breadth of the land, that suitable leaflets and other literature were being distributed to every rural householder, and that all the Agricultural Inspectors had been turned full tilt on to this work. The Agricultural statistics which will show how far the farmers have responded to the demands thus made upon them will not be available for some time; but I have every reason to believe that there has been a further enlargement of the food-producing area of the country. Such a result is all the more desirable as, owing to circumstances which I need not enter into, a similar development is hardly to be looked for in either England or Scotland.

Difficulties inseparable from war-time have arisen in connection with all this endeavour to rise to a great emergency. There was the problem of providing loans from the depleted funds of the Department for the purchase of agricultural implements and machinery. There was the difficulty of getting these requisites into the country—a difficulty caused by shortage of tonnage and of railway facilities, and more likely to increase than decrease. For a like reason there was a scarcity, with a consequent rise in price, of artificial manures. These and other obstacles that stood in the way have been more or less surmounted; and it only remains for the farmers to finish their good work by cleaning and saving the crops to the utmost possible advantage. I would, in particular, urge upon them the importance of spraying their potatoes. Exceptional conditions, such as increase of work in other directions, with perhaps a diminished labour supply, and the greater cost of spraying materials, may tempt some farmers to omit this operation for one year. But the neglect of spraying, with a possible wet season, involves a risk that is specially unjustifiable in present circumstances.

I do not propose to go into any other matter at this stage of the proceedings. From what I have said it will be seen that some rather troublesome questions have to be considered. But I am sure that our deliberations, although they are likely to be prolonged, will be of a practical character and such as will ensure satisfactory results.

# INVESTIGATIONS ON POTATO DISEASES.

(SEVENTH REPORT.)

The special investigations on potato diseases started in 1909<sup>\*</sup> at Clifden, Co. Galway, were continued during 1915, and the present article forms the continuation of a series of reports which have been appearing annually in this JOURNAL from 1910 onwards.\*

The season of 1915 was a good one for potatoes in Ireland, the average yield for the whole country being estimated at 6.2 tons per statute acre, as against 5.9 tons in 1914, and 5.2 tons for the ten-year period 1905-1914. At the ordinary planting time the weather was unfavourable, and much of the planting, including that at Clifden, was done rather late. The advantages of having the seed potatoes selected during the previous autumn and boxed for sprouting purposes were, under the circumstances, fully appreciated. A night frost in the middle of May caused considerable injury to the potato crop in some of the western counties, but its effects were not felt on the Clifden plots. The weather then improved and continued remarkably fine and dry up to the end of June, after which a very wet spell, lasting for six weeks, prevailed. From the middle of August onwards there was considerable improvement in many parts of the country, but at Clifden conditions remained very broken up to and including the time of digging the crop; nevertheless in spite of this the yields were, on the whole, very satisfactory.

The investigations were concerned with the following diseases:—

## I.—THE ORDINARY BLIGHT.

(*Phytophthora infestans* de Bary.)

The most striking feature about the blight for the season under review was the remarkable lateness of its advent. It is true that a single case of it was reported from Valentia Island, Co. Kerry, on 29th May, 1915, and a further case was recorded from Castle-townbere, Co. Cork, on 1st June, but up to the end of June very few further reports of its outbreak were received; and this continued to hold good until well into July.

It was not until 24th July that blight was to be found at all in the Clifden district, and it was only on 7th August that the first spot of blight was found on a plant in the garden at the Clifden

\*See Vols. X., XI., XII., XIII., XIV., and XV. (1910-1915), at pages 241, 417, 334, 445, 433, and 491, respectively.

investigation station, while it was not until 12th August that any appeared on the experimental plots. On that day it was observed on some unsprayed plants of "What's Wanted," a variety which in England has the reputation of being a resistant to blight.

There can be but little doubt that the lateness in appearance of the blight was correlated with the long spell of fine dry weather which prevailed after planting time until the end of June. During the subsequent five or six weeks the weather conditions at Clifden were frequently such as would have

been ideal for the spread of the blight had the fungus already been present on the foliage, but very careful daily search, controlled both microscopically and culturally, failed, as stated, to establish its presence on the plots until 12th August. The absence of the blight during this period therefore must be ascribed to the absence of the fungus which causes it, and not to the absence of suitable conditions for its development and spread. An experience of this kind should be sufficient to convince those who still believe that the potato blight is caused by weather conditions alone that such a view is erroneous. After it had appeared the blight did not make rapid headway (except on one or two plots of reputedly disease-resisting varieties which were purposely left unsprayed); and at digging time there were remarkably few indications of blight in the tubers from any of the plots.

When the "seed" tubers required for the following year had been selected and boxed the remainder were pitted and used up during the winter; and no particular attention was paid to the keeping qualities of this remainder owing to the fact that the investigation station was closed during this period. With regard to the "seed" tubers in the sprouting boxes, however, it was found in the spring that large numbers of them had succumbed to blight during the winter. Doubtless these tubers were already infected or in process of becoming so when they were first boxed, but to such a slight extent that even careful selection for seed purposes failed to reveal its presence. Complaints are not infrequent after seasons in which the attacks of blight have apparently not been severe, that the tubers do not keep well; and in several cases which have recently been inquired into the cause was undoubtedly blight in the tubers. It would therefore appear that in seasons of this kind a considerable proportion of tubers which are affected with blight (but to such a slight degree at the time of pitting that they cannot be recognised as such) are liable to be pitted as healthy, the presence of the disease making itself felt only at some con-



siderable time after storage. In view of this it would appear that the amount of infection with blight in a crop of tubers may be considerably underestimated if determined, as is usually done, at the time of digging, and that a better idea of the total losses due to this disease would be obtainable at a later period when all infected tubers had developed the disease to such a degree as to render it easily visible. At such a period, however, the amount of disease in any given case would be partly that due to primary infection in the field, and partly that due to secondary infection in the pit or clamp. Where, as in most experimental studies, the relative quantitative yields of healthy and diseased potatoes are required for comparative purposes only, the usual method of estimating the amount of disease from that visible on the tubers at the time of lifting the crop is probably the only practicable one to adopt.

The principal spraying experiments in 1915 were carried out on plots at the Department's Agricultural Station at Athenry, Co. Galway. They were designed, as in previous years, to supply information as to the relative efficacies of Burgundy and Bordeaux mixtures of varying strengths and times of application, as compared with each other and with certain powders applied to the foliage by a process of dusting instead of the usual method of spraying. Each plot had an area of two square perches and consisted of two uniform drills. The treatment as regards manuring and cultivation was good, and was identical for all the plots. The variety of potato used was "Up-to-Date," the tubers were boxed and sprouted before planting, and the same number were used for each plot. The plots were on land of very uniform character, but to compensate for any possible irregularities in the soil, each plot was repeated at least six times, while two of them were repeated ten times. In estimating the yields each perch was dug and weighed separately, and the yields given in the succeeding tables are based on the averages of the two perches repeated six or ten times.

Some of the plots were sprayed (or dusted) three times, viz., on 23rd June, 8th July, and 26th July respectively, while others received an additional application on 14th August. A very careful look out was kept for the first appearance of blight, but it was not seen until 28th July, a date much later than that on which it usually appears in the West of Ireland. It appeared first on one of the plots dusted with a powder and on another which had been sprayed with one per cent. Bordeaux mixture. Up to the time of the appearance of the blight—which, it will be observed, was a couple of days after the plots had received their third application of spray or powder—no appreciable differences were to be observed between

the plants in the various plots, but before the third week in August, although the blight did not make particularly rapid headway in most of the plots, yet distinct differences were noticeable, and these differences were found later on to correspond with the differences in yield of the various plots.

The comparative trials of one per cent. versus two per cent.

**Strength of** Burgundy and Bordeaux mixtures, which have  
**Mixtures.** been in progress during recent years, were continued, and this year's results are summarised in the following table, the yields being given in

tons per statute acre.

Mixture used .. ..	BURGUNDY		BORDEAUX	
Strength used ..	2%	1%	2%	1%
Total crop .. ..	13.85	13.85	14.39	13.93
Free from blight .. ..	13.77	13.71	14.3	13.82
Per cent. weight of blighted tubers .. ..	0.55	1.01	0.58	0.73

It will be observed that the total crop is the same in the case of both one and two per cent. Burgundy mixture, and in the case of Bordeaux mixture the total crop with one per cent. spraying is not half a ton per statute acre less than with the two per cent. mixture. In both cases the yield of tubers free from blight is less where the one per cent. mixtures were applied, but the differences are comparatively small. In both cases the one per cent. mixtures gave a greater percentage weight of blighted tubers than the two per cent. mixtures. In the previous year (1914) it was found that the use of the one per cent. mixtures gave both a slightly greater total yield and a slightly greater yield of healthy tubers than that given by the two per cent. mixtures. On the other hand, in 1913 the results in these respects were similar to those of 1915. In all three years (except in one instance) the percentage weight of blighted tubers has been greater where the one per cent. mixture was used. It is hoped to continue these trials over further seasons, but from the work already done it seems fairly safe to assume that, at any rate in favourable seasons, the use of one per cent. Burgundy or Bordeaux mixtures gives results which are not far behind (and in

some years even exceed) those given by the two per cent. mixtures ordinarily employed. Hence, in seasons like the present one of 1916, when copper sulphate is about twice its usual price, those who might hesitate to use a two per cent. mixture should certainly use a one per cent. mixture rather than omit to spray at all, which would be a disastrous policy to adopt. Further, it would probably pay to give two and four sprayings with a one per cent. mixture rather than only one or at most two with the usual two per cent. mixture. Whether in an unusually bad season the one per cent. mixtures will give as good comparative results as the trials have shown they are capable of giving in favourable seasons, remains to be seen. The probabilities are—judging from the comparative percentage weights of diseased tubers with the two strengths—that they would not, and it would therefore, for the present, be unwise to abandon (unless under stress of urgent necessity) the use of the ordinary two per cent. mixtures.\*

In the two previous reports of this series the question of the use of certain powders (containing compounds of copper) dusted on to the damp potato foliage, as compared with the use of the ordinary spraying mixtures was discussed somewhat fully, hence it is not necessary to repeat in the present connection what was then said. A sample of an

**Spraying Liquid  
versus  
Dusting Powder.**

apparently newly introduced powder, called "Raleighite," was met with, which, as regards mechanical composition, exhibited to a very marked degree the serious disadvantages inherent in such powders, which have been alluded to in previous reports. Careful trials in previous seasons showed that, on the whole, the use of powders gave results inferior to those obtained with spraying mixtures made and applied in the usual way. These trials were repeated during the past season on the plots at Athenry and it has already been stated that the blight made its first appearance on one of these powdered plots.

A careful inspection of all the plots made on 19th August, by the author and a colleague, each of whom was unaware of the mode of treatment which the individual plots had received in the matter of spraying or dusting until the completion of the inspection, revealed the fact that in every plot where the powders were used the appearance of the blight on the foliage and stalks was distinctly and decidedly more pronounced than in the corresponding plots which had been sprayed in the usual way. Confirmation of this was obtained when the plots were dug, as will be seen from the accom-

\* For the method of preparation of the mixtures see the Department's Leaflet No. 14.

panying table, the yields being given, as before, in tons per statute acre.

Treatment	Sprayed with		Dusted with	
	2% Bordeaux	2% Burgundy	Powder A	Powder B
Total crop .. ..	14.39	13.85	13.7	13.37
Free from blight .. ..	14.3	13.77	13.47	1.24
Per cent. weight of blighted tubers .. ..	0.58	0.55	1.71	1

It is quite clear that both in total yield and in yield of healthy tubers the powder treatment is inferior to ordinary spraying, while the percentage of blighted tubers is considerably greater where the powders were employed. It is probable that these differences would be more strongly emphasized in an unfavourable season. It should be stated that the powders were applied at the rates and in the manner recommended by their manufacturers as being those in which these powders may most suitably replace ordinary spraying mixtures in combating potato blight. When the increased cost of such powders, the difficulties of satisfactorily applying them, and other points are considered, it would appear that nothing would be gained, but rather the reverse, by their general adoption in place of the usual spraying mixtures.

As is well known Burgundy and Bordeaux mixtures are prepared by treating a solution of copper sulphate with a solution of soda and with milk of lime respectively.

**Burgundy**  
**versus**  
**Bordeaux.**

From the point of view of ease of preparation and subsequent freedom from gritty particles which may choke the spraying nozzles, soda is to be preferred to lime. Many farmers, however, prefer to use lime, and it is certainly true that an excess of lime in the mixture is not damaging to the foliage as is an excess of soda. Hence if due care be not exercised in preparing the mixture the use of lime may be regarded as less dangerous than the use of soda. Price may also play a deciding part as to whether soda or lime should be used, and in the season of 1916, when the price of soda has advanced considerably, many former users of it may incline perhaps to the use of lime. As regards adhesive power, it is generally recognised that Burgundy

mixture is slightly superior to Bordeaux, and Moss's\* experiments, as well as those of former investigators, show that this is actually the case. Pickering† would appear to be the only author who has doubted the fungicidal efficiency of Burgundy Mixture, or, as he terms it, "Soda-Bordeaux," for he states that it would be an expensive one "even if it were effectual." Field experiments, however, have long ago proved that it is an efficient blight preventive, and comparative trials have shown that sometimes its efficiency is slightly greater and sometimes slightly less than that of Bordeaux mixture. In the 1915 trials, as will be seen from the table on the previous page, although the percentage weight of blighted tubers was slightly less with Burgundy mixture, yet the yield of healthy tubers was also about half a ton per statute acre less than where Bordeaux mixture was used.

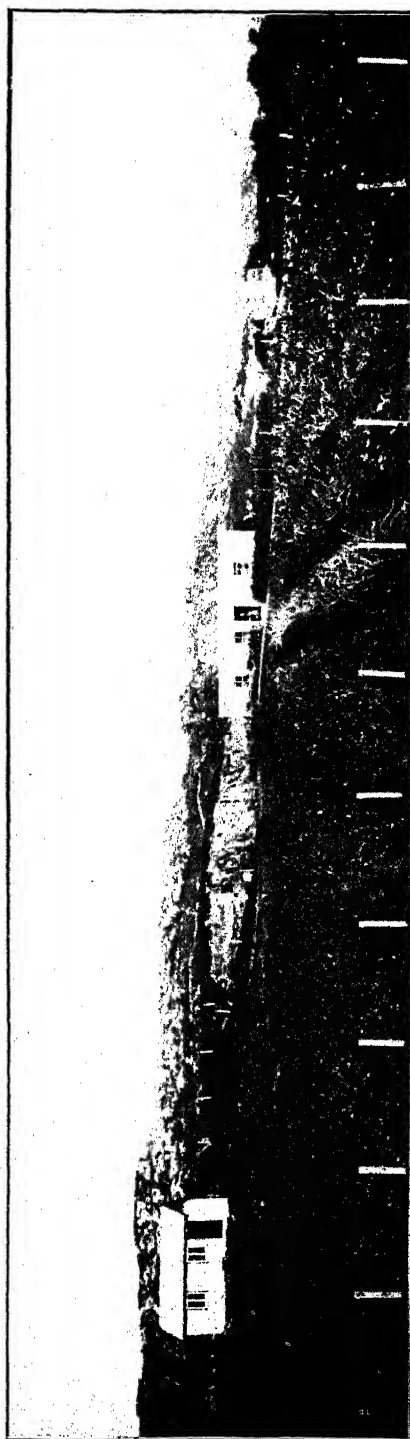
In order to test the efficacy of a blight preventive it is, of course, necessary to have the mixture already on the foliage and stalks of the potato plants when the blight appears and to renew it from time to time afterwards. When the advent of the blight is late it may happen that the usual two or three sprayings, which practice has shown to be desirable, have already been carried out before it appears. It was arranged, therefore, that some of the plots should be sprayed at suitable intervals, more than three times, but it was only found practicable to give one further application, making four altogether. Further sprayings would have been useless, for, when the time for a fifth application arrived, the crop was rapidly ripening off and the foliage and stalks were dying. The average results were slightly in favour of the four sprayings, for they showed an increase of total crop amounting to about two and a half hundred-weight, and an increase of healthy tubers of nearly two and three quarter hundred-weight to the statute acre, when four sprayings were given instead of only three.

It has often occurred to the present author that the spraying of potatoes, as usually carried out in this country, is completed too early in the season, especially when the blight comes late, but it must of course not be overlooked that spraying the potato crop becomes a more troublesome matter as the season advances, for the plants become large and meet in the drills, so that the movement of the machines through the crop, especially if they be horse-drawn, cannot be done without incurring some (and it may be considerable) mechanical damage to the haulms, and this might negate the advantages derived from late spraying. From a theoretical

\* Moss, R. J. : "On the Adhesiveness and other Physical Properties of certain Copper Preparations used for Spraying Potato Plants."—*Economic Proceedings*, Royal Dublin Society, Vol. I., 1899-1909, p. 109.

† Woburn Experimental Fruit Farm, 11th Report, 1910, p. 86.

# INVESTIGATIONS ON POTATO DISEASES.



1 2 3 4 5 6 7 8 9 10 11 12

Fig. 1.—Blight-resistance test. The varieties in Plots 1 to 6 possess more or less highly resistant foliage and stalks, while those in Plots 7 to 12 are non-resistant. (*See p. 571.*)

INVESTIGATIONS ON POTATO DISEASES.



Fig. 2.—Potato-stalk, showing the mode of attack of the Stalk Disease proceeding from the withering leaf on the left. (*See p. 575*)

point of view it would appear that the crop should be sprayed several times at comparatively short intervals, say of ten days or so, with a relatively weak mixture, rather than a few times at long intervals with a comparatively strong one. In practice, however, costs of application and materials and difficulty of application without damage to the growing crop have to be considered and may render a compromise necessary.

Further tests were made at Clifden during 1915 of certain varieties

**Resistance to Blight:** which are more or less resistant to the attacks of blight, and after the advent of the disease those varieties which are really resistant showed

up in strong contrast with other feeble or non-resistant varieties, even when some of the latter were sprayed. Twelve varieties in all were tested. They were not sprayed. About the middle of August, judging from the degree of attack on the foliage and stalks, they could be arranged in the following order of merit :—

Plot No.	2	Clifden Seedling	} practically immune.
„	3	Champion II.	
„	4	“ K ” Seedling*	
„	1	Shamrock	} nearly immune.
„	5	Northern Invincible	
„	6	Summit	
„	7	Arran’s Chief	} strongly resistant.
„	10	Langworthy	
„	9	Golden Wonder	
„	11	What’s Wanted	} feebly resistant.
„	12	Peacemaker	
„	8	King Edward VII.	
			susceptible.

The plots, as they appeared during the first week of September, are illustrated in Fig. 1, where it will be seen that the first six on the left still retain a very large proportion of their stalks and foliage. In Plot 7 the attack of blight is distinctly appreciable, while Plot 8 stands out clearly as being the worst of the whole lot, there being no foliage remaining at all. Plots 9, 10, 11, and 12 are rather worse than Plot 7, but not so bad as Plot 8.

The plots were dug on 10th October, and the total yields varied from 78 to 124 lbs. per sq. perch, i.e., from about five and a half to nearly nine tons per statute acre. The amount of blight in the tubers was, on the whole, exceedingly small. In Shamrock, “ K ” Seedling and Peacemaker it was *nil*. Arran’s Chief alone gave a weighable

\* A variety purporting to have been produced by a cross between Champion and Up-to-Date. The variety is strikingly resistant to blight, but in some other respects it is not satisfactory.



amount, viz.,  $1\frac{1}{2}$  lbs. out of a total yield of  $109\frac{1}{2}$  lbs. to the square perch. In each of the other cases only three or four small blighted tubers were found. It is rather remarkable that although the foliage of King Edward VII. was the first to go, nevertheless this variety gave the biggest yield, viz., 124 lbs. to the perch, and produced only four blighted tubers. It must be remembered, however, that the blight came very late in this particular season, and even when it came the attacks were not, on the whole, severe. In the great majority of the plots at Clifden where non-resistant varieties were planted, but where three sprayings were given, there were at the time of digging either no tubers at all visibly affected with blight, or at the most but two or three.

From similar trials made during the past few years it is clear that we do possess a few varieties of potatoes which are undoubtedly extremely resistant to blight, and which are capable of retaining their foliage green and practically unimpaired right to the end of the season *without being sprayed*, even in the extreme west of Ireland, where climatic conditions are, as a rule, highly favourable to blight. Unfortunately, however, this highly desirable characteristic of blight-resistance is not necessarily coupled in these varieties with other essential characters such as cropping power and "quality," and they do not, therefore, become popular. It is interesting to note that the most highly resistant varieties are somewhat slow growing, they do not come through the ground so early as most other varieties, and they ripen off comparatively late.

	For several years past potato tubers badly affected with blight,
	but still possessing some unattacked sprouts and
<b>Result of</b>	hence not entirely dead, have been planted at
<b>Planting</b>	Clifden with the object of ascertaining, if possible,
<b>Blighted</b>	whether such tubers or any plants which may
<b>Tubers.</b>	develop from them, could be regarded as being
	the source from which the blight emanated. In

1915 two hundred such tubers were planted, one half of them being laid at the ordinary depth, i.e., covered with three or four inches of soil, and the other half being planted shallow, i.e., with a layer of soil only one inch in thickness over them, the idea being that if the blight came from either of them it would probably come from the shallow planted ones. The one hundred tubers planted at the ordinary depth gave rise to eighty-two plants of varying vigour, but healthy and free from blight, and the shallow planted tubers to seventy-five similar plants. As has already been stated, the blight first made its appearance on the Clifden plots on 12th August, 1915. The plants arising from the blighted tubers were subjected to particularly close examination, but not a spot of blight was found on one of them until 30th August, and even then it was evident

that the infection must have come from neighbouring affected plants, for no signs of any direct connexion could be traced between the infected foliage and the diseased tubers from which these plants arose. Since, therefore, the blight appeared on the other plots some eighteen days earlier than it appeared on the plants derived from the diseased tubers, it is clear that the latter cannot have been the original source of infection. Two days after the first spots of blight were observed on one of the plants derived from the blighted tubers, one half of the plants from both the shallow and the deep planted lots were dug, and it was found that the tubers were quite free from disease, proving that the idea entertained in some quarters that the blight may pass directly from the parent tuber to the new generation is most improbable. The remainder was dug on 14th October, 1915, when four to five per cent. by weight of the produce was found to be blighted, the infection having taken place, of course, from the diseased foliage in the usual way.

The experience of the past six years at Clifden in the matter of planting badly blighted tubers has been that on the average only about half of them produce plants at all, but in not a single instance have such plants served as a centre from which the blight has spread. This result is perhaps contrary to what might have been expected, especially in view of the results obtained by older workers, such as de Bary and Jensen, and also in view of our own experiments referred to in earlier reports when the diseased tubers were planted in pots. It would, therefore, not be wise to deduce from negative evidence of this kind that the attacks of blight in the field never originate as a result of the planting of diseased tubers. It may be that the tubers used for the experiments were already too far diseased when planted for positive results to be obtained. It is certain that they were so badly affected that no ordinary farmer would for a moment have utilised them for seed purposes. It is possible that by the use of tubers which at planting time were only slightly blighted other results would have been obtained. It is at any rate interesting in this connection to note that Melhus,\* in the United States of America, has been able to supply further evidence in support of de Bary and Jensen, and to show that potato tubers infected with *Phytophthora infestans*, if used for seed purposes and planted under field conditions, may become the cause of the development of an epidemic. Hibernation of the mycelium in the tubers is, so far as is at present known, the only way in which the blight fungus survives in nature from one season to the next. Hence it can only be from such tubers, either discarded or possibly used for seed purposes, that the outbreaks originate each year.

\*Melhus, I. E.: "Hibernation of *Phytophthora infestans* in the Irish Potato."—*Journal Agric. Research*, Vol. 5, No. 2, 1915, p. 71.

## II.—THE STALK OR SCLEROTIUM DISEASE.

(*Sclerotinia sclerotiorum* Massee.)

The severity of the attacks of this disease in the plots at Clifden during 1915 was much less than that experienced during the previous five or six seasons. It may be recalled that the disease takes its origin each season from the small black resting bodies (*sclerotia*) which are formed by the parasitic fungus in and on the stalks of attacked plants during the previous season and which pass the winter in the soil. These *sclerotia* germinate and produce on or near the surface of the soil the so-called apothecia or "spore-cups," from which the spores which cause the infection of the new crop are dispersed into the surrounding air in small puffs or clouds.

Doubtless as a consequence of the prevalence of unusually dry weather up to about the end of June, the germination of these *sclerotia* in the soil of the plots was delayed until a much later period than usual. In spite of systematic search no germinated *sclerotia* were to be found until 10th July, whereas in other seasons they have been found a month, and even six weeks earlier than this.

In the first two reports of this series some stress was laid on the manner in which the potato plant becomes

**Mode of** infected with this disease. Before the present  
**Infection.** investigations were started it was commonly believed, and in some quarters dogmatically held

that primary infection occurred solely from the spawn or mycelium of the fungus present in the soil, and that therefore the stalks first become attacked at soil level. It did not require a prolonged study of the disease in the field to become convinced that such was not the case, and it was proved experimentally at Clifden that infection really occurred directly from the air-borne ascospores produced by the spore-cups or apothecia. Although these spores, or, perhaps, more correctly speaking, their germ tubes, are incapable of entering normally vigorous green potato foliage and stalks, they are evidently capable of causing infection of the foliage when it is yellowing and ripening off, and probably are also capable of infecting the stalks at the scars remaining when the older leaves have fallen.

During the past season at Clifden circumstances were very favourable for observations on the mode of attack of this fungus, and in very numerous instances it was abundantly clear that infection occurred first on one of the older yellowing leaves from which the fungus passed directly to the stalk which bore it. If, as frequently happens, such an infected leaf during its decay comes into contact with other leaves or stalks, the fungus finds its way easily to such

leaves and stalks. As a result of last season's observations it is now believed that it is almost entirely through these yellowing leaves, and not so much through leaf-scars, that infection occurs.

A particularly clear example of the course of infection is illustrated in Fig. 2. The old leaf which first became attacked and is now dead is situated on the left. On its stalk, about half an inch from its junction with the main stem, a small, round, unripe sclerotium, still white in colour, will be seen. At its very base, where the leaf-stalk joins the stem, is another considerably larger sclerotium, which, however, does not stand out so clearly in the photograph as it did in the object. From this leaf and its stalk the fungus has spread to the stem (the attacked area being light coloured) and to the young lateral shoot on the right borne in the axil of the first affected leaf, the base of this young shoot being already considerably disorganised.

During the last few seasons the experiments connected with this disease carried out at Clifden have been designed mainly with a view to ascertaining whether the losses caused by the disease can to some extent be checked by planting at a later date than usual. The idea underlying them has been to have the potato plants in such a stage of growth at the time when the distribution of the spores is at or about its maximum that they possess few or no yellowing leaves. The same state of affairs can to some extent also be realised by planting the tubers further apart than is often customary in the ridges common in the West of Ireland, and by paying special attention to proper weeding of the crop; and each of these matters deserves more attention than it frequently receives.

Eighteen plots, divided into six series of three each, were devoted to a further experiment on the above lines in 1915. Each plot had an area of one square perch, and was planted with the same number (120) of previously boxed and sprouted Up-to-Date tubers. As regards cultivation, manuring and spraying, the plots were treated similarly, and planting was done at six fortnightly intervals, beginning in the middle of March and ending at the beginning of June. The land on which the plots were laid down had been in grass for the four previous years. At suitable intervals the plots were carefully examined and the number of plants affected with the stalk disease in each was recorded. The first examination was carried out on 23rd June, before any germinating sclerotia had been found anywhere on the premises at Clifden; and, as was to be expected, not a single affected plant was found.

The particulars of these countings and the yields from the plots expressed in tons per statute acre, are summarised in the following

table, the figures giving in each case the average result for three separate plots.

Time of Planting	Average Number of Affected Plants on				Average Total Yield
	15 July	2 Aug.	18 Aug.	4 Sept.	
Middle of March ..	11	55	95	100	13.5
Beginning of April ..	9	39	91	96	14.1
Middle of April ..	5	48	102	104	13.6
Beginning of May ..	1	52	103	108	13.3
Middle of May ..	0	43	101	109	12.3
Beginning of June ..	0	6	72	86	12.0

It will be observed that on the whole the degree of attack becomes distinctly less the later the tubers are planted, although the plots planted at the beginning of April form an exception from August 2nd onwards; what may be the cause of this it is impossible to say. The maximum yield was obtained from the plots planted at the beginning of April.

This experiment has now been repeated during four seasons, and the accumulated results show clearly that the attacks of the disease *are* sensibly reduced by late planting. As regards yield, however, extremely late planting leads to reduction owing to the shortening of the growing period of the crop. During the various seasons the maximum yields have been obtained from plantings varying in date from the beginning of April to the middle of May, these yields being influenced, of course, not alone by attacks of the disease, but also by seasonal climatic factors. Hence a definite time cannot be laid down as being the best for planting potatoes on land where this disease is to be feared, but it is believed that the abnormally early planting in February, and even sometimes January, which is carried out in some of the milder districts of the West of Ireland is disadvantageous both in relation to this and to other diseases. Better results could undoubtedly be obtained by boxing and sprouting the seed tubers and planting them at more reasonable later dates.

The ordinary spraying of the potato crop for blight has little or no influence on the stalk disease, but it was thought possible that by an additional spraying with something other than Bordeaux or Burgundy mixtures, particularly if such a spraying could be directed upon the older yellowing foliage especially, some good might accrue. Trials of this kind were made at Clifden so long ago as 1910, but they were rather restricted in character, and the results were not very definite. It was therefore decided to make a more extended experiment in 1915.

For this purpose sixty plots, each having an area of one half of a square perch, were laid down. As regards cultivation and manuring, all the plots were treated similarly. Three varieties of potatoes were used, viz., Up-to-Date, Champion, and Irish Queen, the same number of tubers being planted in each plot. All the plots were sprayed four times in the usual way with Burgundy mixture to ward off the blight. Twenty-four of the plots received no additional spraying, and they served as controls. Of the remaining plots, eighteen were sprayed twice with milk of lime, and eighteen (also twice) with a lime-sulphur solution, particular care being taken to see that these materials should reach and cover the lower and older portions of the stalks and foliage. At suitable intervals during the season the number of plants attacked by the stalk disease was counted and recorded for each plot.

In the following table the results of the experiment are summarised, the yields being expressed in tons per statute acre.

Variety	UNTREATED					MILK OF LIME					LIME-SULPHUR				
	Average No. of Affected Plants on				Average Total Yield.	Average No. of Affected Plants on				Average Total Yield.	Average No. of Affected Plants on				Average Total Yield.
	12 July	8 Aug.	16 Aug.	3 Sept		12 July	8 Aug.	16 Aug.	3 Sept		12 July	8 Aug.	16 Aug.	3 Sept	
Up-to-Date..	1	7	27	33	18.6	2	4	23	29	18.7	1	8	31	38	18.6
Champion ..	1	5	19	25	14.4	1	1	12	19	14.9	0	4	17	25	15.1
Irish Queen..	2	11	35	42	14.0	2	6	30	38	13.4	2	8	33	42	13.7
Average ..	1	8	27	33	15.7	2	4	22	28	15.7	1	7	27	35	15.8

It will be observed that the yields are in all cases good, and that the number of plants affected with disease is considerably less than often occurs, since in severe cases every plant may become attacked, whereas in no case in the present experiment were more than forty-two out of the sixty plants per plot affected. It is clear that the disease was most prevalent in the variety Irish Queen and least so in Champion, while Up-to-Date took an intermediate position. With Up-to-Dates the two methods of treatment have had no appreciable effect on the yield. With Champions the treatment in both cases has resulted in a slight increase, while with Irish Queen there has been a slight reduction in yield. On the whole the experiment shows that the methods of treatment employed were of no distinct advantage either in securing freedom from the stalk disease or in producing an increased crop.

Fortunately, the fungus which causes the stalk disease does not, like those causing several other potato diseases, affect the tubers

in addition to the stalks and foliage, and it has been supposed that the fungus cannot grow at all on potato tubers. This, however, is not the case. Pure cultures derived from ascospores were studied and experimented with in 1909 and 1910, and it was found that this fungus was capable of growing and of producing its sclerotia on slices of living tubers when kept under suitable conditions of moisture and temperature. Fig. 3 illustrates two such slices, and shows the spawn and sclerotia of the fungus on them, together with drops of an exuded watery acid liquid.

There is a point regarding the life-history of the fungus which causes the stalk disease to which it seems necessary once more to call attention, although this was done in the report for 1914. Frank, in 1881, in describing a disease of rape caused by this fungus, found the conidial stage of a *Botrytis* associated with it, and he concluded, without really adequate proof, that this *Botrytis* fructification was a stage in the life-history of the stalk-disease fungus then known as *Sclerotinia Libertiana* Fuck. but known at an earlier date as *Peziza sclerotiorum* Lib., and now, in accordance with the very widely accepted international rules of botanical nomenclature, more correctly called *Sclerotinia sclerotiorum* Mass. The mistaken idea that this fungus possesses a *Botrytis* stage in its life cycle has, unfortunately, been perpetuated for many years, and seems hard to kill. De Bary,\* in his studies of the fungus in 1886, found no *Botrytis* stage. Ten years later McWeeney† showed that the *Botrytis* often found on the potato in Ireland had nothing to do with *Sclerotinia*, or, as he then called it, *Peziza postuma*, and R. E. Smith,‡ in 1900, showed that *Botrytis* must not be confounded with *S. Libertiana*. Appel and Bruck,§ in 1906, showed, by means of pure cultures, that this species of *Sclerotinia* had no *Botrytis* stage, and these results were confirmed by cultures made at Clifden in 1909 and 1910. Further confirmation of them was provided in 1911 by Westerdijk,|| and, lastly, in 1915, by Lind.¶ There is, therefore, no excuse for perpetuating the error.

It is true that certain structures have long been known and described which occur in *S. sclerotiorum* as well as in some other species of this genus, and which may perhaps be regarded as abortive conidiophores and conidia, and it is these structures, apparently, which led Shaw and Ajrekar\*\* to suggest that a fungus which, curiously enough, they identified *Rhizoctonia Napi* West., should be

\* *Botanische Zeitung*, 44, 1886, p. 378.

† *The Sclerotium Disease of Potatoes*. National Education Office, Dublin [E.O. 901], 1896, p. 9.

‡ *Botanical Gazette*, 29, 1900, p. 369.

§ *Arb. Kais. Biol. Anstalt*, 5, 1905-7, p. 189.

|| *Meded. Phytopath. Lab. W.C. Scholten*, Amsterdam, II., 1911, p. 21.

¶ *Ann. Mycol.*, 13, 1915, p. 13.

\*\* Shaw, F. J. F. and S. L. Ajrekar: "The genus *Rhizoctonia* in India."—*Mem. Dept. Agric. India. Bot. Series 7, No. 4, 1915, p. 177.*

INVESTIGATIONS ON POTATO DISEASES.

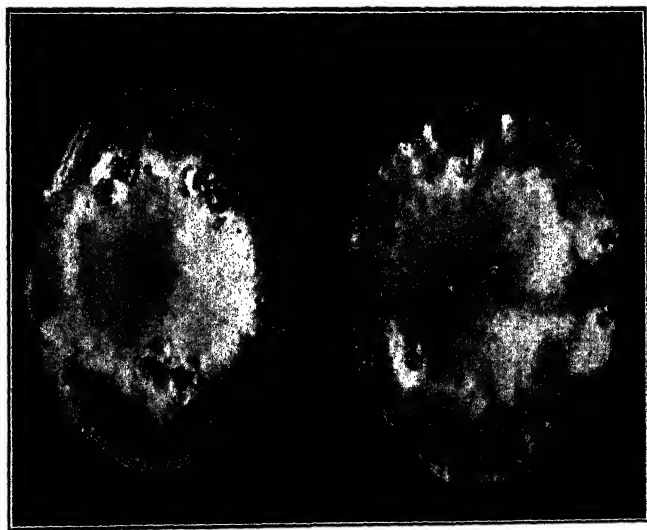


Fig. 3.—Two slices of a living potato tuber on which *Sclerotinia sclerotiorum* is growing and producing mycelium and sclerotia. (See p. 578.)

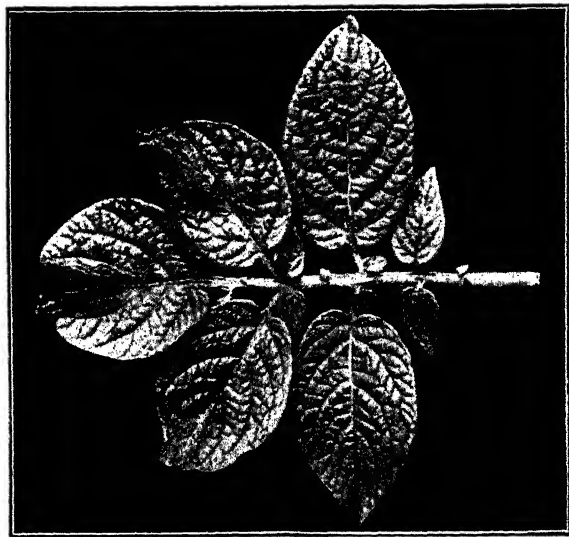


Fig. 4.—A potato leaf, having the three upper leaflets affected at their tips with the Botrytis disease. (See p. 580.)



INVESTIGATIONS ON POTATO DISEASES.



Fig. 5.—A potato stalk showing the progress of the Botrytis disease from the upper leaves, on the left, downwards. The leaf on the right is still healthy. (*See p. 581.*)

removed from the genus *Rhizoctonia*, into which they nevertheless put it, "as it appears to be merely a synonym for *Botrytis*." The *R. Napi* West. of these authors, judging from the description given, is clearly a species of *Sclerotinia* which never should have been included in the genus *Rhizoctonia*, and which probably has no true *Botrytis* stage at all. These authors are also incorrect when they suppose that Istvanffi obtained satisfactory evidence that *Botrytis cinerea* and *Sclerotinia Libertiana* Fuck. are different stages of the same fungus; for, Istvanffi's researches were concerned with *Sclerotinia Fuckeliana* (de Bary) Fuck., an entirely different species.

It is most unfortunate that all this confusion should have arisen, particularly in view of the fact that in addition to the stalk disease of the potato caused by *S. sclerotiorum*, there is another quite distinct but hitherto not sufficiently clearly appreciated disease caused by *Botrytis cinerea*, which has, it is true, a sclerotial condition, but as regards which a sufficient amount of precise evidence has not yet been forthcoming to permit of a definite conclusion being come to as to whether it is a species of *Sclerotinia* or not. This *Botrytis* disease will now be dealt with.

### III.—THE BOTRYTIS DISEASE.

#### (*Botrytis cinerea* Pers.)

In the very first year that the present series of investigations was started it was evident from observations in the field that the above-named fungus was responsible for considerable damage to the potato plant,\* and during the second season (that of 1910) some experiments were carried out, an account of which was subsequently published.† During the following seasons the further study of this disease had, for various reasons, to be left in abeyance. But during the past season of 1915 an excellent opportunity for its study presented itself and was eagerly availed of to make further observations. It has already been mentioned that the nature of the weather for the six weeks during July and the first half of August was such that had the blight fungus been present it would have found almost ideal conditions for its spread. It was, however, absent. But the very same conditions were also extremely favourable to the development and spread of the *Botrytis* disease; and thus the rare chance occurred of studying it unmasked by the coincident development of blight.

In the earlier reports already alluded to attention was, perhaps, more particularly directed to the effects produced by the fungus

\* JOURNAL, Dept. Agric. and Tech. Inst., Vol. X., No. 2, Jan. 1910, p. 250.

† Ibid., Vol. XI., No. 3, April, 1911, p. 435.

on the *stalks* of the potato plant; but it was also pointed out that it might attack the older, yellowing leaves, and apparently also the younger, green ones.

This latter point was abundantly confirmed during the past season. Infection normally occurs on the young and apparently perfectly healthy green foliage during a spell of continued wet and warm weather.

**Description of Disease.** The first obvious signs of the disease are brown, dead areas on the leaflets, which may be of various shapes and sizes and situated in various regions of the leaflets. Perhaps the most frequent and characteristic way in which the diseased area develops, however, is by starting from the extreme apex of the leaflet and proceeding more or less uniformly towards its base. The area of dead tissue is limited at the upper end by the margin of the leaflet and sharply at the lower end by a pair of the principal curving lateral veins which run from the midrib to the margin. Thus the base of the dead area is V shaped so long as the leaflet is not wholly browned. Contraction of the killed portions of the leaflets occurs, and thus they become more or less curled or contorted when dry. An early stage of infection is illustrated in Fig. 4. Here the terminal and two large lateral leaflets are affected from their apices to a distance of from one-third to one-half of their lengths. The contrast between the brown dead tissue and the still healthy green portions is in nature very distinct, but unfortunately much less so in the photograph. The other leaflets are still perfectly healthy.

If leaves with the browned, dead areas be gathered and kept covered in a moist atmosphere for twenty-four hours or so, a luxuriant growth of mouse-coloured spore-bearing branches of the fungus, grows up from the surfaces of the spots. These are quite different in appearance from the spore-bearing branches of the potato-blight fungus which make their appearance when blighted leaves are placed under similar conditions; but it is perhaps hardly necessary to describe them here in detail, particularly since they are well known to all mycologists. If sections of the spots on the leaves be made and examined with the microscope, the spawn or mycelium of the fungus is readily seen in the tissues, and it extends nearly but not quite up to the line of demarcation between the diseased and the still healthy cells.

In the field the spore-bearing branches of the fungus are also produced to some extent on the spots on the foliage which remains on the plants, but only if the weather is persistently moist. They are, however, developed in great abundance on the older leaves which have fallen off and which lie on the damp soil in the shade of the plants, even when a period of comparative dryness prevails.

INVESTIGATIONS ON POTATO DISEASES.



Fig. 6.—A potato plant in process of destruction by the Botrytis disease. (*See p. 581.*)

INVESTIGATIONS ON POTATO DISEASES.



Fig. 7.—A potato plant killed by the Botrytis disease.  
(See p. 581.)

From the first-infected leaflets the disease spreads to the others of the same leaf, and from it to the stem, the spreading being caused largely by the growth of the internally situated spawn or mycelium. In persistently wet weather the spread may be quite rapid, but it becomes slower or ceases almost entirely if the weather becomes temporarily dry. From the stem it passes to the lower leaves which, if not already infected and in process of death from their apices downwards, may then become infected at their bases. Fig. 5 illustrates a case in which the four uppermost leaves on the left and the portions of the stalk bearing them are already dead, while the fifth leaf, on the right, has not yet become affected.

The disease in cases as described thus progresses distinctly from above downwards, and finally involves the death of the whole plant. All the upper part of the foliage dies and turns brown, while the stalks themselves turn a light green or yellowish colour and have a watery or translucent appearance, owing to the destruction of the cortical portions by the fungus. A whole plant badly affected and standing in the plot as it grew is illustrated in Fig. 6. Fig. 7 shows another such plant at a more advanced stage, removed from the field and placed in a pot for convenience in photographing.

While the lower leaves may fall off either before or after infection and death, many of the upper dead leaves remain much longer attached to the stalks, and their weight frequently causes the upper part of the stalk to fall over. Such bent-over stalks are well seen in Fig. 6.

After the cortex of the stalk has been destroyed the stalk itself becomes almost white in colour. It now consists chiefly of the hollow woody cylinder, adherent to which are the remains of the cortex and a number of black flattened bodies, which are the resting bodies (sclerotia) of the fungus, and which serve to tide it over the winter. These are illustrated in Fig. 8, which is reproduced here from a previous report on this disease. In the accompanying Fig. 9 will be seen the last stage of the plant illustrated in Fig. 6, from which, however, the small lateral branch on the left has purposely been cut away. The black sclerotia can be seen dotted about all over this white dead stalk; the upper part of the dead foliage is still hanging and the stalk has fallen over at a point towards its upper end.

The foregoing description applies to what may be regarded as the usual course of events in connection with this disease. It sometimes happens, however, that the attack does not involve the whole plant but is more or less localised to certain portions of it. In cases of this kind only one or at most a few leaves are killed, together with the portion of the stalk to which they are attached, and a distinct fracture of the stalk at a node often results.

When this fracture occurs, as it sometimes does, low down near the level of the ground, the whole upper portion of the plant may fall over and become "haughed" in much the same way as when it is attacked near soil level by the sclerotium disease. An illustration of this is given in Fig. 10. Here infection of the leaf on the left has occurred, but its base (still retaining its original thickness) is still sound, and infection has not passed from this leaf either to the main stem or to the lateral shoot in its axil. The leaf on the right hand, however, is completely dead, and infection both of the main stalk and of the base of the young lateral shoot has already occurred from it. The infected area on the main stalk is somewhat dark-coloured and is furnished with a copious growth of *Botrytis conidiophores*. The stalk was softened and hollow at this point and the plant had fallen over. For clearness' sake most of the healthy portions of the plant were cut away before the photograph was made. This phase of the *Botrytis* disease, as observed here in Ireland, is of considerable interest, as it seems to agree fairly well with what has already been described as a *Botrytis* disease of potatoes by Ritzema Bos in Holland.\*

The sclerotia formed both on the outside and on the inside of the more persistent woody cylinders of the dead stalks are flattened, black bodies of various shapes and sizes, but never of any great thickness. When examined microscopically in sections they possess the structure characteristic of such bodies, and they very frequently include within themselves elements of the destroyed cortex of the host-plant. They are clearly to be distinguished from the sclerotia of the stalk-disease fungus *Sclerotinia sclerotiorum* Mass., the structure and germination of which have been dealt with already in the present series of reports in this JOURNAL.†

The sclerotia of *Botrytis* mostly remain on the old potato stalks until the following spring. They then germinate, but have not up to the present been observed to produce "spore-cups" or apothecia. Instead, they produce a luxuriant crop of conidiophores and conidia (spores) which serve to reproduce the disease again. One such germinating sclerotium is shown in Fig. 11; and Fig. 12, which is reproduced from a previous report, gives an idea of the wealth of infective material developed from the sclerotia adherent to even a small piece of an old potato stalk. The experiments at Clifden in 1910 clearly showed the efficacy of such old stalks, when placed among the crop, of ensuring the re-appearance of the disease.

It has long been a disputed question as to whether these sclerotia are or are not identical with those of *Sclerotinia Fuckeliana* Fuck., a fungus which is parasitic on the vine, and whether on germination they do or do not produce apothecia. If they do, then *Botrytis cinerea*

\* *Zeitschr. f. Pflanzenkrankheiten*, Bd. 4, 1894, p. 144.]

† See Vol. X., No. 2, Jan., 1910, p. 249.

INVESTIGATIONS ON POTATO DISEASES.

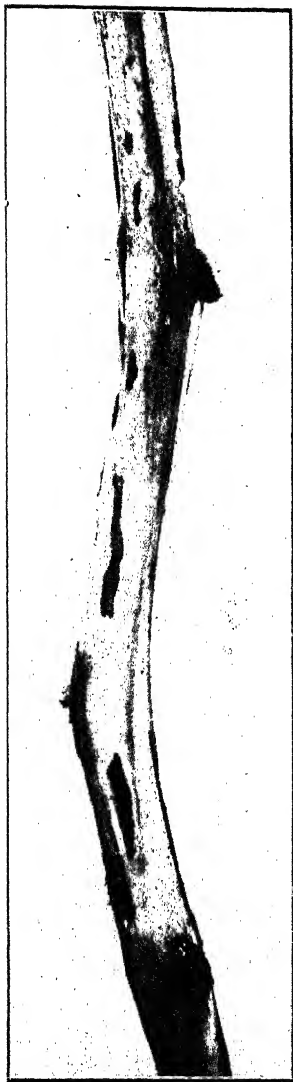


Fig. 8.—A dead potato stalk with the black, flattened sclerotia of *Botrytis cinerea* adhering to it. (See p. 581.)

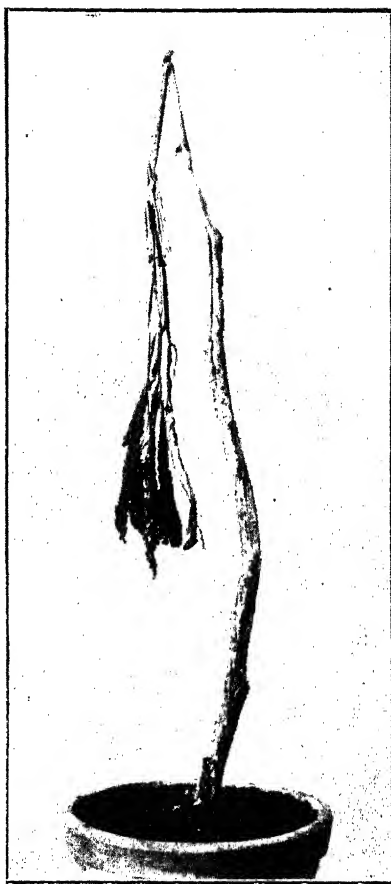


Fig. 9.—The same plant as shown in Fig. 7, but at a later stage. (See p. 581.)



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Fig. 10.—Portion of a potato stalk which was “hauged” near the bottom as the result of Botrytis attack. Infection proceeded from the leaf on the right to the main stalk, and thence to the lateral shoot in its axil. (See p. 582.)

must be regarded as merely the conidial stage of *S. Fuckeliana*. Latterly certain authors appear to have concluded that this question had been definitely settled by Istvanffi's\* work, and that the connection between the two stages had been clearly and definitely demonstrated. A critical examination of this author's work, however, does not appear to justify this conclusion. It cannot be considered as definitely proved that *Botrytis cinerea* and *Sclerotinia Fuckeliana* are only different stages of one and the same fungus until both these stages have been found to develop in pure cultures which had an ascopore or a conidium as their starting points, and this does not yet appear to have been done.

Pure cultures of this *Botrytis* from single conidia were obtained at Clifden and the growth of the fungus studied. It develops freely in various media, and forms both conidia and numerous sclerotia. The latter bodies are always more or less thin or flattened structures, often wavy or convoluted. Not infrequently the smaller ones present a convex upper surface above the substratum on which they have been formed, and this gives them an appearance of solidity which they do not in reality possess, and has led non-critical observers to confuse them with the sclerotia of *S. sclerotiorum*.

Special attention has been paid to the behaviour of the sclerotia of *Botrytis* (both those formed naturally on the potato stalks and those developed in artificial cultures) during the past nine months. They have been kept under various conditions, and while in some cases no apparent change has taken place, yet in the majority of instances they have produced, after longer or shorter intervals, merely a crop of *Botrytis* conidiophores and conidia. In one instance an apothecium was found on a sclerotium on a potato stalk, but two similar younger ones developed very near the margin of the sclerotium and not actually on it, hence suspicions were aroused. The ascospores from this apothecium did not give rise to growths of *Botrytis*, but to a fungus more nearly approaching a *Verticillium*, and sections made through the apothecium and the sclerotium on which it was borne, suggested that the former had probably grown up through the latter from below. Up to the present no signs of the development of apothecia by the *Botrytis* sclerotia themselves have appeared, and it seems doubtful, therefore, whether they can really be regarded as belonging to *Sclerotinia Fuckeliana*.

Opportunity has not yet presented itself for carrying out any extended series of infection experiments with *Botrytis*. These will require more facilities for controlling the very important conditions of moisture, temperature, etc., than are at present available. Special difficulty will probably be met with in securing and keeping the necessary control plants free from infection owing to the ubiquitous distribution of the spores of *Botrytis*. But even in the absence of

\* *Ann. Inst. Cent. Amp. Roy. Hongrois*, Tome 3, Liv. 4, 1906.

such definite experimental proofs, which are so desirable and necessary in work of this kind, it is felt, from the observations made, that there cannot be any serious doubt of the part played by this fungus in destroying potato foliage and stalks under the special weather conditions referred to. Further, it seems highly probable that during wet seasons in this country, when the ordinary blight due to *Phytophthora infestans* is present, the total damage to the stalks and foliage is not alone due to the latter fungus, but that a share of it (and perhaps more than one would be inclined at first to suppose) is due to *Botrytis cinerea*. To avoid any misunderstanding on the point, however, it should perhaps be added that the last named fungus does not, like the blight, affect the tubers.

As regards treatment not much can be said, but it will be obvious from the description given that something can be done to lessen infection by burning the old potato stalks when the crop is being lifted. This should be done in any case always be done, for they may be the harbourers of many pests. Spraying with the usual mixtures as for blight appears to have little or no effect on the disease. So long as the wet weather persists the disease spreads and extends in spite of spraying. Some varieties are not so easily attacked as others, and particularly those which are resistant to the ordinary blight are also resistant to *Botrytis*.

#### IV.—THE VERTICILLIUM DISEASE.

(*Verticillium albo-atrum* Reinke and Berthold.)

This disease is not a new one, but it is only as the result of the work of comparatively recent years that its status as a disease *sui generis* has become definitely recognised. It is not, so far as is known, really prevalent in Ireland, and up to the present, indeed, only three cases of it have been met with here. It is not, therefore, like the majority of the potato diseases dealt with in these reports, to be found especially in the West of Ireland, where so many of them find a more or less congenial home. As a matter of fact no case from the West has up to the present been met with. On the other hand, it appears to be a disease which makes itself felt more particularly on lighter soils, and in comparatively dry and warm climates. Owing, however, to its interesting nature from the pathological point of view, and especially to the limited amount of definite information available concerning it, a study of the disease was undertaken.

The investigations have been carried on over a considerable period, and brief references have been made to them in these reports,

# INVESTIGATIONS ON POTATO DISEASES.



Fig. 11.—Portion of a potato stalk with an adhering sclerotium of *Botrytis* which has germinated and developed a tuft of spore-bearing branches of mycelium. (See p. 582.)

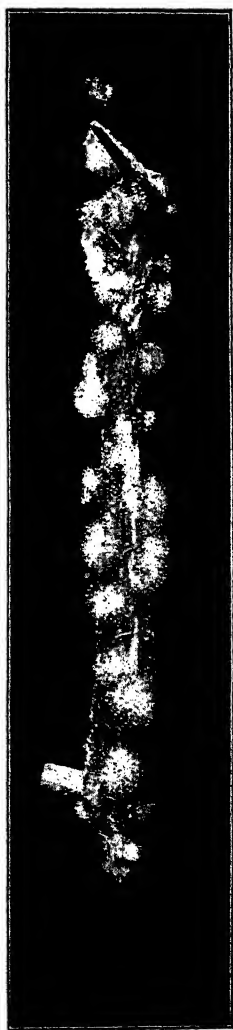


Fig. 12.—Portion of an old potato stalk showing the tufts of spore-bearing mycelium produced from the adherent sclerotia of *Botrytis cinerea*. (See p. 582.)

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Fig. 13.—A potato plant affected with the *Verticillium* disease in the drill. (See p. 585.)

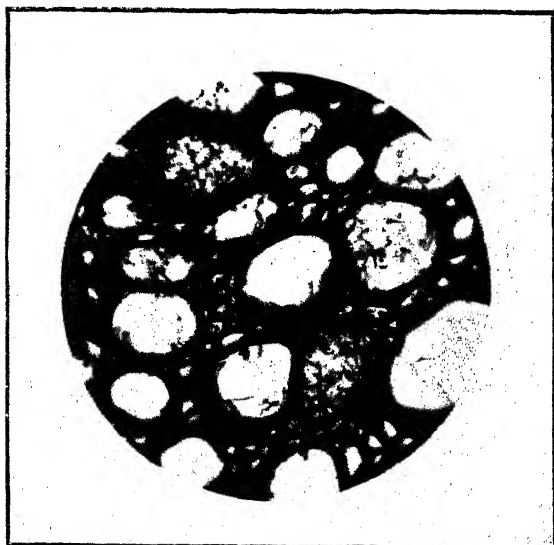


Fig. 14.—Cross section (highly magnified) of the woody portion of an underground, tuber-bearing stem of a potato plant, showing the choking of the vessels with the mycelium of *Verticillium albo-atrum*. (See p. 585.)

usually under the headings of Leaf Roll and Leaf Curl. A full and detailed account of these studies has recently been published,\* and it will, therefore, only be necessary to give a short summary of them here. It may at once be stated that the disease must no longer be regarded as a form of Leaf Roll or Leaf Curl, for it differs essentially from what is now accepted as the true Leaf Roll disease, and the term Leaf Curl has been used indiscriminately in the past for more than one type of disease, so that it cannot well now be applied to the Verticillium disease, even if the name were in all respects appropriate, which is far from being the case.

The symptoms of the disease vary a good deal, but in the main they resemble at first sight those of the bacterial disease known as Black Stalk Rot; but with this important difference, namely, that whereas in the latter disease the stalk of the potato near and below the soil level becomes black and rotten, in the Verticillium disease it remains apparently sound and healthy. The leaves of a plant affected with the Verticillium disease are usually discoloured, the leaflets often become at first rolled or folded, then they turn brown and dry up. A rather gradual process of dessication occurs in the plant, which may wither and die away quite prematurely, or, if the attack is not so violent, as is much more rarely the case, the plant may, without appearing badly diseased, live for about the normal period. The premature death of the plant, of course, has an adverse influence on the yield, which frequently consists of nothing but a few small and practically useless tubers, which, however, do not rot. In Fig. 13 an affected plant of the variety Duchess of Cornwall is illustrated, which is typical of what is generally seen of the disease in the field.

The disease is caused by the parasitic fungus known as *Verticillium albo-atrum* R. and B., which is found in the plant, while the latter is still alive, in the wood vessels, that is, in the channels through which the water and salts absorbed by the roots of the plant pass to the foliage. It is to the choking of these conducting channels with the spawn or mycelium of this fungus that the withering and ultimate death of the plant by drying up is due. This choking effect of the vessels is well illustrated in Fig. 14, which is a photograph of a cross section of portion of the woody tissue of one of the underground stems of an affected potato plant. When the stalks are dead the fungus spreads from the wood vessels into the elements of the neighbouring tissues, and after developing here to an increased extent, its spawn proceeds to change

\* Pethybridge, G. H.: "The Verticillium Disease of the Potato."—*Sci. Proc. Royal Dublin Society*, Vol. 15 (N.S.), No. 7, March, 1916, p. 63.

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Inoculated.

Control.

Fig. 16.—Inoculation experiment with *Verticillium*. The inoculated plant on the left has been killed by the disease, while the uninoculated plant (Control) on the right has remained sound and healthy. (See p. 587.)

to depend rather upon the amount of infection already in the tuber than on the mere size of the tuber. If the degree of infection be but small, and a considerable period elapses before the fungus reaches the new stalks, the plant may make comparatively good growth. In exceptional cases, indeed, the amount of infection may be so small that the plant completes its growth before the fungus can reach it, and thus a healthy plant may arise from an infected tuber, although, as stated, this is very rarely the case.

The fungus found in the woody tissues of diseased plants has successfully been isolated and cultivated under different conditions and on different media. It has also been used to carry out infection experiments on healthy plants, in which it has been possible by inoculation through wounds in the stalks or sprouts to reproduce the disease. Such artificially infected plants produce tubers containing the fungus, and these if planted during the following season, give rise to diseased plants. A case of this kind is illustrated in Fig. 16. Similar sized healthy tubers were planted in the two pots, all the sprouts but one having been removed from them before planting. When the young green shoots were about two inches high a wound was made just below soil level in each of them with a sterile knife. In the case of the plant on the right ("control") nothing further was done than to bind up the wound with a strip of tinfoil and replace the removed soil. In the case of the plant on the left ("inoculated"), however, before covering up there was introduced into the wound a small portion of a pure culture of the fungus. The inoculation was made on 12th May, and the photograph was taken on 29th July, 1914. It will be remarked that the inoculated plant has remained less than half the size of the control, and that it has almost completely withered away. Many such inoculation experiments were carried out both in field and greenhouse, and all gave essentially similar results, so that there can be no doubt as to the parasitism of the fungus in question.

Exactly how primary infection of a healthy potato plant occurs naturally in the field has not yet been ascertained, but it is probable that it takes place from the soil, and perhaps through the roots. Hence land which has borne a crop of potatoes infected with this disease should be kept free from potatoes for a time, because either the fungus will already be present in it or will be conveyed to it from the remains of the infected plants, which it is impossible to remove entirely from the land. Not only the stalks and tubers, but also the foliage, roots, and underground stems of affected plants contain the fungus, and these parts, if left to rot in the soil, contaminate it.



Potato stalks should always be burned to destroy infective material not only of this but also of other diseases.

The tubers from affected plants may safely be used for feeding purposes, particularly if cooked. On no account, however, should such tubers be allowed to be chosen for seed purposes. Indeed the best means of keeping free from this disease is to take particular care about the selection of seed potatoes, and to see that they are derived from sound, healthy stocks only. It is to be feared that not all or even many of our seed-potato growers are sufficiently alive to the importance of raising and distributing for seed only such tubers as are free from disease of all kinds; and particular attention should be given to these more or less insidious diseases transmitted through seed-tubers such as this *Verticillium* disease, Black Stalk Rot, and true Leaf Roll.\* In some of the diseases which are transmitted through the seed-tubers, such as the blight and various forms of scab, it is usually more or less easy to detect the presence of the disease by careful examination of the tubers, but with the other diseases mentioned above this is much less easy or well nigh impossible, at least for the farmer. In such cases it is very important that the crops, if intended for seed purposes, should be thoroughly examined *while they are growing*, when it is a comparatively easy matter—provided the inspection is carried out by a really competent person—to recognise and eliminate the diseased mother plants which will produce affected progeny. The produce of crops which are seriously affected with such diseases should on no account be permitted to be used for seed purposes.

Experiments are at present in progress to ascertain whether the mycelium of the fungus present in the vessels of infected tubers can be killed by heating them without interfering with the vitality of the tuber. The experiments are not yet concluded, but it may be stated that it has been found that heating such tubers for a period of five hours in an incubator, at a temperature rising from 41° C. to 45.5° C. does not suffice to kill the fungus, nor does it adversely affect the tubers. There are indications, however, that better results may follow heating to this temperature for a more protracted period.

\* The term Leaf Roll is now by general consent to be restricted to that type of disease of the potato in which the foliage becomes rolled, but in which fungi or other micro-organisms do not appear to play an important part—if indeed any. The recent researches of Quanjer in Holland show that in cases of true Leaf Roll a degeneration of the elements of the phloem or bast occurs, and hence the term *phloem-necrosis* has been suggested for this trouble. In contradistinction to this the *Verticillium* disease, and perhaps one or more *Fusarium* diseases, are cases of the choking of vessels with fungus mycelium. The term *vascular mycosis* has been suggested in America as descriptive of this type of disease, but I have pointed out that *hadromycosis* would be a more precise term and Quanjer correctly speaks of *tracheo-mycosis* in this connection. True Leaf Roll is a disease of very serious economic importance on the Continent, and Quanjer's most recent work (*Meded. van d. Rijks Hoogere Land-, Tuin- en Boeshouderschool*. Deel 10, 1916) suggests that it is caused by a transmissible "virus." Happily up to the present this disease has not been met with in Ireland, but it is necessary to be specially on the alert concerning it.

## V.—“BLACK SPECK SCAB” AND “COLLAR FUNGUS.”

(Hypochnus Solani Prill. et Del.)

It may now be regarded as clearly proved that the Collar Fungus, *Hypochnus Solani* of Prillieux and Delacroix (1891), is merely the perfect or fructifying stage of the well-known one which causes the so-called “Black Speck Scab” on the skin of the potato and which was formerly known as *Rhizoctonia Solani* Kühn. This latter name ought therefore now to be relegated permanently to the realms of synonymy. Since the publication of last season’s report a very interesting historical account concerning the known species of *Rhizoctonia* has appeared, written by Prof. B. M. Duggar.\* This author admits the connection between *Hypochnus Solani* and *Rhizoctonia Solani*, but still retains the latter name. It will be observed, further, that he uses the name *Corticium vagum* B. and C. as a synonym, which certainly does not appear to be legitimate. Rolfs† states that the fungus agrees well with the description of *Hypochnus Solani* Prill. and Del., but that several specimens of it were sent to Dr. Burt, who concluded that it was a variety of *Corticium vagum* B. and C. for which he suggested the name *Corticium vagum* B. and C. var. *Solani*. Duggar states that Burt also recognised that the “collar” stage agreed closely with, and might be identical with, *H. Solani* Prill. and Del. For the present, therefore, there seems no reason why the use of the legitimate name *Hypochnus Solani* Prill. and Del. should not be insisted on. Amongst the synonyms are (1) *Rhizoctonia Solani* Kühn, and (2) *Corticium vagum* B. and C. var. *Solani* Burt. in full and not in the abbreviated form adopted by Prof. Duggar. It may not, perhaps, be amiss to suggest that before it is concluded that the true *Corticium vagum* B. and C. is really intimately allied to the “Collar” fungus *cultural studies* of it should be undertaken, and the results of them compared with those already made with *Hypochnus Solani*.

Reference was made in last season’s report to the unfortunate confusion which is so often found in the literature in connection with the genus *Rhizoctonia*, but Duggar’s publication will be of great assistance in making matters clear. This author shows how Shaw, in one of his recent papers, has gone astray as regards *R. Solani*, etc. In a more recent one still it is to be feared that the latter author and a colleague have gone even further astray.‡ They describe a disease of mustard as due to a fungus which is obviously (although

\* Duggar, B. M.: *Rhizoctonia Orocorum* (Pers.) DC. and *R. Solani* Kühn (*Corticium vagum* B. and C.), with notes on other species:—*Annals Missouri Bot. Garden*, Vol. 2, 1915, p. 403.

† Bull. 91, Ag. Exp. Sta., Colorado Agric. Coll., June, 1904, p. 10.

‡ Shaw, F. J. F. and S. L. Ajrekar: The genus *Rhizoctonia* in India; Mem. Dept. Agric. India. Bot. Series, Vol. 7, No. 4, Aug., 1915, p. 177.

not necessarily, because it has a Botrytis stage) a species of Sclerotinia, but which they identify as *Rhizoctonia Napi* West. According to Rabenhorst, the *R. Napi* West. ap. Kickx of Saccardo, which is presumably the fungus referred to by Shaw and Ajrekar, is synonymous with *R. rapæ* West. et Wall. ap. Westend. mentioned in Bull. Ac. Belg. 18, 402 (1851).<sup>\*</sup> Here is to be found a "Notice sur quelques Cryptogames inédites ou nouvelles pour la flore belge," by C. D. Westendorp, in which a description is given of "*Rhizoctonia rapæ* nov. sp.—*R. napææ*, West. et Wall. Herb. crypt. belg. No. 225." The sclerotia (*tubercules*) of this fungus are described as being brownish red (*brun roux*) within and brown approaching to black (*brun noirâtre*) and velvety (*tomenteux*) on the outside. The sclerotia described by Shaw and Ajrekar, however, are said to be "black on the outside and white in the interior" and they cannot therefore belong to *R. Napi* West. Further, Duggar has examined the type material of *R. Napææ* West. et Wall. and has found that it agrees with the authentic descriptions of *Rhizoctonia Solani* Kühn. It is evident that a careful revision of the nomenclature of the sclerotium-bearing fungi recently described as being members of the genus *Rhizoctonia* occurring in India will have to be made.

Although *Hypochnus Solani* is quite common on the potato in Ireland it is difficult to estimate the amount of damage—if any—which it causes to the crop. In the United States of America, and particularly in the drier regions, it appears to cause more trouble than in this country, and it is interesting to note that when potatoes are grown in pots in a greenhouse under somewhat dry conditions in this country the fungus seems to find circumstances more favourable to its development than it does in the open ground.

One very important question is as to whether this fungus is really responsible for a definite rot of the tuber; and the experimental work carried out during the past year has been almost entirely in connection with this problem. Frank<sup>†</sup> in 1897 was apparently the first to maintain that this fungus was responsible for a definite type of wet rot of the tuber. The diseased flesh of the tuber is stated to be soft, watery, translucent and resembling a piece of cooked turnip. The starch had almost entirely disappeared from the cells, which contain only clear sap and little protoplasm, and, finally, they die with loss of turgor. From tubers of this kind a fungus was eventually obtained by Frank which was identical with *Rhizoctonia Solani*. This, however, was not sufficient to prove that this fungus was the real cause of the rot, as Frank himself

<sup>\*</sup> Apparently really published in 1852.

<sup>†</sup> Frank, A. B.: *Ueber die Ursachen der Kartoffeläule*. Centralbl. f. Bakteriologie, II., Bd. 3, 1897, p. 13.

of course recognised, and he therefore attempted infection experiments, the results of which are described at some length. A critical survey of the evidence he brings forward to prove that this wet rot is caused by *B. Solani* at once shows that the attempt was in reality a failure, in fact it is clear that a rot of the nature described did not develop as a result of the infection trials.

It may be stated that a rot corresponding very closely to that described by Frank has often been observed at Clifden, and has provisionally been called "Watery" or "Glassy" Rot.

"watery" or "glassy" rot. A considerable amount of time and trouble has been expended in trying to ascertain its cause, but so far without success. This form of rot, however, is of practically no economic importance, and has only been found to occur in a few of the small, useless tubers which generally remain attached to the parent plant at the time of digging. In some cases *Hypochnus Solani* has been found as a pure growth in such affected tubers and has been so isolated from them, while similarly affected tubers have in other cases yielded pure cultures of a *Botrytis* which appeared to be identical with *B. cinerea*. Occasionally while incubating affected tubers in a moist atmosphere *Rhizopus nigricans* grew on the diseased areas. Numerous infection experiments were made on tubers of various sizes with *Hypochnus Solani* but in no case did any rot take place. No infection experiments were made with the *Botrytis*, as previous trials with the same fungus isolated from leaves gave negative results, and as *Rhizopus* only occurred once or twice trials with it were not undertaken.

Occasionally no fungi are present and apparently no bacteria, since portions of the watery tissues removed aseptically and placed on suitable nutrient media have given rise to no growths. Nor has it been found possible to cause a development of this rot in healthy tubers by embedding portions of tissue from a watery-rotted one in them. Hence, for the present, the cause of this rot remains undecided.

Rolfs \* in his report on potato failures in 1904 says that "seed-tubers are frequently invaded by the light-coloured hyphae of this fungus, which gradually turn the flesh watery and soft." Further, he says: "Five out of eight seed-tubers infected with this fungus placed in sterilised sand on 2 July, 1903, and examined three months later were completely rotted by a wet rot produced by this fungus. The remaining three were also completely rotted at the end of the fourth month, while five check tubers which were free from the fungus remained sound. . . . cultures taken from the . . . rotten tubers . . . produced pure cultures of *Rhizoctonia* in every instance."

\* loc. cit. p. 11.

M'Alpine \* makes the statement that this fungus "may cause rotting of the tubers, so as to give rise to an appearance resembling brown rust," and he provides an illustration of this form of rot. But since no evidence of any scientific value is adduced to show that this form of rot really is produced by *Rhizoctonia* the statement cannot yet be accepted as correct.

Duggar† appears to assume that the fungus causes a rot of potato tubers, and says that "the rot is a form of disease which appears relatively late in the season when certain conditions prevail, or possibly when the fungus has for one reason or another developed unusual virulence. The disease is supposed to originate either from stem infections, from sclerotia, or from scab areas." It is fairly evident that Duggar himself is not familiar with this rot, and at any rate he brings forward no experimental evidence of its existence.

It may be stated here that when a potato is killed, e.g., by suffocation, or by heating in the pit, or by frost, it becomes invaded very readily by *Hypochnus Solani* if this fungus be present. The numerous infection trials with healthy living potatoes made during the last few years by us have, in every single instance, been unsuccessful in producing any rot. When inoculated through a wound the hyphae invade the cells killed in the making of the wound, but are prevented from proceeding further by the rapid formation of a layer of cork.

A particularly careful experiment was made towards the end of last year on the lines of that of Rolfs with seed-tubers already alluded to. Selected tubers, raised in October, were carefully cleaned and disinfected in formaldehyde solution. For the purposes of inoculation three different strains (in pure culture) of *Hypochnus Solani* were used, derived from a basidiospore, a sclerotium and the mycelium within a "watery" rotted tuber, respectively. In every case wounded but uninoculated tubers were treated similarly to those inoculated, in order to serve as controls. The tubers were buried in sterilised silver sand in two series of dishes in one of which the sand was dry while in the other it was moist. The inoculated tubers and the controls, of which there were ninety-six altogether, were arranged in batches, which were very carefully examined at the ends of one, two, three and four months.

The dishes containing the tubers were kept during the period indoors at laboratory temperature, and the tubers in the course of time developed sprouts, showing that they all remained alive. All of the twenty-four control tubers remained perfectly sound

\* M'Alpine, D.: *Handbook of Fungus Diseases of the Potato in Australia, and their Treatment*. Melbourne, 1911, p. 60.  
 † loc. cit. p. 435.

and free from any rot. On the tips of two sprouts on one of the control tubers examined after three months a few small sclerotia of *Hypochnus* were found, otherwise all the sprouts produced by the remaining control tubers were perfectly healthy. Of the seventy-two inoculated tubers, not a single one showed the slightest sign of any rot. In every case there was a certain amount of growth and development of the fungus at the inoculation wound, and in some cases, particularly in the moist sand, even over the whole exterior of the tuber, but nowhere did actual penetration of the tuber by the fungus occur. In some cases, particularly in the wet sand, the sprouts produced by the inoculated tubers became attacked by the fungus in varying degrees, some of them being killed outright. Nevertheless, in spite of this, the fungus did *not* enter the tuber from the dead sprouts, as Duggar says it is supposed to do. Where the tubers were left for four months in damp sand very considerable proliferation of the lenticels of the tubers occurred, but notwithstanding this, the fungus did not make any entry into the tuber through them.

These results are, therefore, directly contrary to those obtained by Rolfs, and they show clearly that, under the conditions of the experiment, the fungus cannot cause a rot of potato tubers. It is particularly significant in Rolfs's experiment that no mention is made of the tubers used being provided with, or having produced, sprouts during the course of it. Seed potatoes are stated to have been used, and the experiment was started in July. This omission clearly suggests that the tubers used by Rolfs in his experiment may have been dead or may have died during the experiment apart from any action of the fungus, and, if so, this would be a complete explanation of his apparently anomalous results. Rolfs himself states that "numerous attempts to produce a wet rot by inoculating healthy tubers with both the sclerotia and rhizoctonia stage have failed; however, a dry rot has occasionally developed."

Summing up, therefore, although it might perhaps be going somewhat too far to state that *Hypochnus Solani* is incapable of causing a rot of potato tubers, it may certainly be said that sufficient positive evidence has not yet been produced to show that it ordinarily can and does do so.

## VI.—MISCELLANEOUS.

In addition to the investigations already dealt with, a considerable amount of work on some other diseases of the potato has been done; but it would occupy too much space to discuss the details here, and it is the less desirable to do so seeing that some of this work is by no means yet finished.

Since the publication of the last report of this series a paper has been received from the United States of America in which Kunkel\* describes some investigations on the life-history of *Spongospora subterranea* (Wall.) Johnson. This author claims to have observed the mode of germination of the spore-balls of this organism and describes the method by which he believes the tubers become infected. He also describes the plasmodium stage of an organism which he believes belongs to *Spongospora*. We have spent considerable time in endeavouring to corroborate Kunkel's results on the germination of the spore-balls, but without achieving any positive success. The difficulties of obtaining or keeping the spore-balls in culture free from contamination with other micro-organisms are well nigh insuperable, consequently there is a danger of making observations on organisms which may have no connection whatever with *Spongospora*. There seems to be an impression in the United States of America that *Spongospora* causes a rot of the tuber, and Kunkel speaks of this organism as being the cause of a dry rot which he considers to be a mild form of the canker stage. It is a little difficult to see why an attack of this kind should not be covered by the description "scab," or why it is necessary to introduce the term "rot" at all. Certainly in Ireland *Spongospora* has never been observed to cause a rot of the tuber, using this word in its generally accepted sense. A case in which *Spongospora* was presumed to be causing a rot of a tuber was submitted from America some little time ago, but investigation here clearly showed that the rot was due to a species of *Fusarium*, which had originated at or very near to a *Spongospora* scab-spot, thus giving the false impression to a superficial observer that *Spongospora* was the cause of the rot.

A minor blemish of the skin of potatoes, scarcely worthy perhaps of the name disease, and known as "Dry Scab," or "Silver Scurf," was described and illustrated in last year's report. The name of the organism (*Spondylocladium atrovirens* Hartz.) responsible for it is perhaps more formidable than the actual damage done to the tubers. This organism is very common here, and in some seasons, if pains be taken to discover it with the aid of the microscope, it can be found on almost any and every tuber of certain varieties such as Up-to-Date. Our experiments, as well as those of others, have shown that this fungus is not capable of causing a rot of potato tubers, a rôle which had formerly erroneously been assigned to it. Owing to the very great difficulty experienced last season in obtaining potatoes which were free from the minute sclerotia of this fungus it was necessary, for the purposes of our experimental work, to use tubers which had been disinfected, and the great difficulty of killing

\* Kunkel, L. O.: "A contribution to the life-history of *Spongospora subterranea*."—*Jour. Agric. Research*, Vol. 4, No. 2, June, 1915, p. 265.

the sclerotia of this organism on the skin of the potato with solutions of formaldehyde soon became apparent. Steeping for two hours in solutions of formaldehyde varying from 0.16 per cent. to 1 per cent. had no apparent adverse effect on the vitality of the sclerotia. Steeping was then carried out in a 1 per cent. solution for periods of two, four, six and eighteen hours, respectively. After steeping the tubers, they were in each case washed in sterile water and placed in a covered dish in a 20° C. incubator. Even after six hours' treatment the fungus was found to be still alive, but during this period the solution had penetrated the eyes of the tubers and had killed twelve out of twenty-one of them, while after eighteen hours twenty-two out of twenty-four were dead. It is therefore clear that treatment with formaldehyde is not to be recommended, if for any purpose it is desired to kill the sclerotia of *Spondylocadium* on the skins of potatoes. In field practice, of course, no treatment of seed tubers for such a mild form of blemish as this generally is would be economically worth while.

In a recent article on Silver Scurf by Schultz\* it is pointed out that this disease was not recorded for the United States of America until 1908, whereas it has been known in Europe since 1871. It by no means follows from this, of course, that the disease has recently been introduced into America from Europe. Since the Western hemisphere is the home of the potato itself it may also well be the source of origin of many, if not most, of the parasites which live on it and which have found their way into Europe from America with it. The fact that since the time when this fungus was first recorded in America further search has proved it to be pretty well distributed there would appear to show that had it been looked for earlier it would probably have been found, even as long ago as 1871.

The article referred to does not furnish any particularly important new information concerning the disease or blemish caused by this fungus. No estimate of the damage due to it is attempted, although methods of control which are partially satisfactory are suggested. It would appear fair to conclude, therefore, that in the United States of America, just as in Europe, the amount of scientific interest in the causative organism far outweighs any really economic significance which the disease may possess.

Studies of Dry Rot have been continued and extended during the past season, and some interesting results obtained. This disease is by no means unimportant, and considerable losses are often occasioned by it, particularly in seed-tubers. In most of the cases so far investigated, which include not only Irish but also Scotch and English material, the fungus which appears as a rule to be the cause of the rot is *Fusarium coeruleum* (Lib.) A. and W.,

\* Schultz, E. S.: "Silver Scurf of the Irish potato caused by *Spondylocadium atrovirens*."—*Jour. Agric. Research*, Vol. 6, No. 10, June 5, 1916, p. 339.



and a considerable series of infection experiments has been carried out with it which clearly show its pathogenic character, especially under certain conditions. It would also appear that the age of the tuber is of paramount importance in many cases in deciding whether infection and consequent rotting shall occur or not. Further details must be reserved for a more detailed account which it is hoped may be published later on.

While no special experiments were carried out with Pink Rot (*Phytophthora erythroseptica*), it appears worth while

**Pink Rot.** to put on record the fact that a piece of land on which a crop affected to some extent with this disease was borne in 1910 was laid down to grass for four years and only replanted with potatoes in 1915. The resulting crop was affected to a considerable extent with Pink Rot, there being over five per cent. of the weight of it rotted by the organism named. In the same crop the weight of tubers affected with the ordinary blight was exceedingly small, hence the damage done by Pink Rot in this case was very much greater than that caused by the blight. It is evident that the organism responsible for this rot is easily able to survive for four years, even in land which bears only a crop of hay.

Associated with the parasitic organisms which have occupied the forefront of attention in these reports, and which are responsible for most of the diseases described, are a considerable number of harmless saprophytic fungi have been met with from time to time. **Harmless Organisms.** These have been studied more or less in detail, and their harmlessness proved by inoculation experiments; and this has occupied no inconsiderable amount of time and trouble. The details concerning these organisms, however, are more or less of an academic or purely scientific interest, and they may well be reserved for publication elsewhere.

As in previous years, I have been fortunate in having as co-workers in these investigations Mr. H. A. Lafferty, A.R.C.Sc.I., who has been largely responsible for isolation and cultural work in the laboratory, and Mr. T. O'Connell, A.R.C.Sc.I., who laid down and superintended the plots at the Agricultural Station, Athenry, in a way which left nothing to be desired, while Mr. P. J. Hopkins acted as an efficient outdoor assistant at Clifden during the season. To these colleagues I desire to express my cordial thanks for their hearty assistance in the work, and I have further to express my acknowledgments to Mr. G. Brownlee, B.Sc., and to Mr. T. Price for making the negatives at my request which are used in Figs. 13 and 16, respectively.

GEORGE H. PETHYBRIDGE.

July 1, 1916.

## NOTES ON THE PRINCIPAL PROVISIONS OF THE FISHERIES (IRELAND) ACTS RELAT- ING TO MILLS AND FACTORIES SERVED BY WATER POWER.

*\* \* These notes are not to be regarded as an official exposition of the law, but they may be of assistance to persons who contemplate starting new milling enterprises or the revival or improvement of ancient concerns of the like nature. Such persons, however, should study the Sections of Acts of which a list is given at the end of the article, and will be well advised to take no serious action without consulting their legal advisers. The Acts must be read in the knowledge that the powers of the Commissioners of Fisheries and of their successors, H. M. Inspectors of Irish Fisheries, are now exercised by the Department.]*

Fishery Law relating to rivers and lakes is locally enforced by the Boards of Conservators of Fisheries for the several Districts into which the country has been divided for this purpose. The boundaries of these Districts are set forth in Appendix II. with the name and address of the present Clerk of each District. The word "Conservator," where used in these notes, means a Conservator of Fisheries for the District concerned.

Since Fishery Law is, in effect, the same for all enterprises which involve the diversion of water from a river, be it for mill, factory, waterworks, or any purpose whatever (subject to certain exceptions respecting navigation and fish ponds), the word "miller" is used below to denote a person controlling any such enterprise (not so excepted), and "weir" means any weir or dam used in connection therewith and not wholly or in part for fishing purposes. These notes are not concerned with weirs intended solely for fishing, nor with "fishing mill dams," which last are defined as dams used or intended to be used partly for the purpose of catching or facilitating the catching of fish, and partly for the purpose of supplying water for milling or other purposes. For the sake of completeness, however, it has been thought well to include, in the list of Sections of Acts (see Appendix I.), those which refer to fishing mill dams.

The right to divert water from a river by any means and to use it for any purpose is a question of property and outside the purview of Fishery Law, which is confined to prescribing certain conditions under which such diversion and use must be conducted. These conditions are intended for the protection of the fishery of the river in general, and not for the protection of several interests of fishery or of lands or water power. Consequently, a miller, though he comply in every respect with the requirements of the Fishery Law,

does not thereby escape his responsibilities under Common Law, if his operations interfere with the property or rights of other people.

### WEIRS.

A weir, *on any river frequented by salmon*, constructed or enhanced since the 10th August, 1842, must be so constructed as to allow the passage of salmon, trout and other fish at all times of the year. In other words, in such a weir, if it be of a nature to obstruct the passage of fish, the miller is bound to provide at his own expense a fish pass or ladder, approved by the Department as fulfilling the above requirements. Persons who may contemplate the erection of a new weir or the enhancement of an old weir would, therefore, do well to consider whether the volume of the river in dry seasons is sufficient to provide water both for their own purposes and for the passage of fish over the pass. There are rivers which, while valuable as breeding places for salmon and trout in winter, often fall so low in summer that these fish cannot ascend certain reaches of them, though the summer volume of water is sufficient to work mills. In such situations a fish pass, fulfilling the requirements of the law, serves no useful purpose during a great part of the year, because fish cannot get near it; but millers should remember that the power to enforce the strict letter of the law exists, though Conservators and other reasonable people are content as long as fish can get over the weir at any time they are likely to seek to do so.

A miller concerned with a weir erected before the 10th August, 1842, and not since enhanced, cannot be put to expense in constructing a fish pass, but, on the application of persons interested and at the proper charges of those persons, the Department may cause the weir to be so altered as to provide for the passage of fish at all times of the year, so long as the effective working power of the mill be not impaired. A somewhat similar provision enables the Department to make fish passes over weirs at the expense of the Conservators. For a number of years, whenever there has been question of putting a fish pass in an ancient weir, the matter has been disposed of by friendly arrangement between the miller and the people interested in the local fisheries, and the Department's action in the matter has been confined to lending the assistance of one of their engineers if asked to do so. It is to be hoped that similar arrangements will be made if the present proposed revival of milling leads to the rebuilding (without enhancement of the 1842 conditions) of a number of ancient weirs which would obstruct the passage of fish if they were not in ruins. In this connection it may be permissible to remark that makeshift repairs with dry stone are most objectionable, since repairs of this sort leave the weir in the condition of a grating which no fish can pass except when the river is in heavy flood.

Fish passes must be open at all times to inspection by the Department and the Conservators, and by persons duly authorised by them.

No person may fish, save with rod and line, within two hundred yards above or below a weir, unless he has exercised a lawful right of several fishery there for the twenty years preceding August, 1850. This, of course, includes exercise by predecessors in title, but no person, whatever his title, may fish, except with rod and line, at, or within, 50 yards either above or below any weir or dam unless there is therein a fish pass, approved by the Department and actually discharging at all times of the year a flow of water sufficient for the passage of salmon.

Fish may not be taken in a fish pass and no contrivance for taking fish may be set in or near a fish pass, and all fish passes must be kept clear of obstructions of any kind. In these respects a miller is responsible not only for his own acts but for the acts of his employees or of any other persons, if he has not taken reasonable care to prevent offences.

The Constabulary have power to remove obstructions (including nets, etc.) from fish passes and mill races, but such removal does not abate the responsibility of the persons who caused or allowed the obstruction.

It occasionally happens that a miller, in whose weir is a pass fulfilling the requirements of the law, finds himself short of water at a season when no fish are running, and applies to the Department for permission to close the pass. If satisfied that no interest will be injured, the Department are wont to reply that they will raise no objection to the pass being closed for a specified short period, and to inform the Conservators and the local Royal Irish Constabulary. Though such action is not specifically contemplated in law, it seems to serve its purpose well enough.

*A King's Gap* is a gap, complete from top to bottom and of specified width and relation to weir and river, which is required in a *Fishing Weir*. It is mentioned here, because persons, whose knowledge of Fishery Law is incomplete, have been known to confuse an opening of this sort with a fish pass and worry millers accordingly.

#### WATERCOURSES AND SLUICES.

In any watercourse, cut, channel or sluice constructed for the purpose of conveying water *from any river frequented by salmon*, for milling purposes, there must be placed and fixed at the points of divergence from and return to the river a grating of bars not more than two inches apart. This grating must extend across the whole width of the watercourse, and from the bottom of its bed or sill to the highest level of winter or flood water. Also, during the months of March, April, and May, and during other times of the year when salmon fry or trout fry are descending the river, there

must be placed or stretched over the entire surface of the grating at the point of divergence a wire lattice or network of such dimensions as effectually to prevent the admission of salmon fry or other small fishes into the watercourse, etc. These gratings and lattices must be securely fixed and kept in constant repair, and those which are at the point of divergence must be outside the sluice controlling the intake of water.

These provisions became applicable to mills in 1869, but there are a number of mills where no attempt seems to have been made to enforce them. Especially is this the case with mills which have now been derelict for many years, and persons who contemplate the restoration of an old mill should remember that attention to gratings, etc., is much keener than in the old days when salmon were less valuable because means of marketing them were more difficult than at present.

In general, the watercourses of a mill consist of a single head race, and one or more tail races. In the course of the head race there may be one or more waste gates or waste weirs, from which surplus water falls directly into the river or is conducted thither by a waste race. In so far as gratings are concerned, not much attention is paid to the return of water through waste weirs and waste races, so long as the sluices at the intake of the head race are kept in proper repair and regulated according to the actual requirements of the mill. If, however, a miller fails to provide a head sluice or lets it fall into decay or neglects to regulate it, he has only himself to thank if he is invited to grate the outlet of his waste weir or waste race as well as the head race and tail race.

Occasionally it appears that a miller has acquired his mill without any express right to the banks of the mill races, but if he pleads that this condition of affairs prevents him from complying with the requirements of the law, the plea avails him not. Intending millers should, therefore, make sure that their title gives due control of both banks of the races in so far as it may be necessary for the maintenance and regulation of gratings and sluices, or the prevention of offences for which they may be held responsible.

The Acts do not specify the form or pattern of gratings or lattices, which last are generally known as "fry guards," but the gratings in universal use consist of vertical iron bars, strengthened, when the height of the grating makes it necessary, by one or more iron cross pieces.\* Flat bars, with their edges set in the direction of the current, naturally obstruct the flow less than round or square bars of the same strength. The greatest care must

\* In 1869 H.M. Inspectors of Irish Fisheries issued a series of drawings entitled "Diagrams illustrating the General Principle of Construction of Fish Guards." These diagrams, of which a few copies appear to remain in the possession of Conservators, are not authoritative as to detail of construction, and may be disregarded.

be taken to make and maintain a close fit between the grating and the sides and bottom of the race, and to straighten out the bars if at any time they get bent so as to leave a space of more than two inches in part of the grating. Similarly fry guards must make a close fit. As to their material, a guard actually complying with the law so as to prevent the passage of any "small fish" would also prevent the passage of a great deal of water, and in practice a fry guard is considered to serve its purpose if it is close enough to keep out the young of salmon and white trout (which are salmon within the meaning of Fishery Law) during their periods of descent to the sea. Salmon in this stage are called "smolts" in Great Britain, but in Ireland generally have no more distinctive name than "salmon fry." White trout or sea trout in the silvery livery of descent are known in some parts of Ireland as "pink."

Probably the most efficient fry guard, and the most convenient for cleaning, is one made of vertical iron or steel bars set not more than three-eighths of an inch apart, but such guards are very expensive if the race is of any considerable size. Most of the lattices of vertical wires with occasional cross ties, which appear to be a stock article with wire workers, are wholly unsatisfactory. They are very liable to buckle and attempts to clean them usually result in unduly enlarging some of the apertures. Ordinary galvanised wire netting of half-inch mesh seems to do well enough. It is most convenient if made up in panels of manageable size, sliding in a frame set in the race; and the work of cleaning is immensely facilitated if two sets of guards and a double frame are provided (see Figs. 1 and 2).

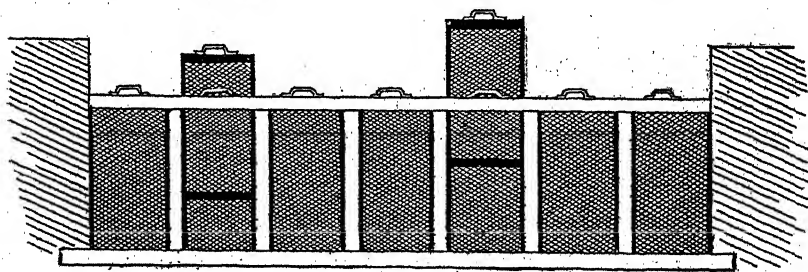


Fig. 1—Elevation of Fry Guard.

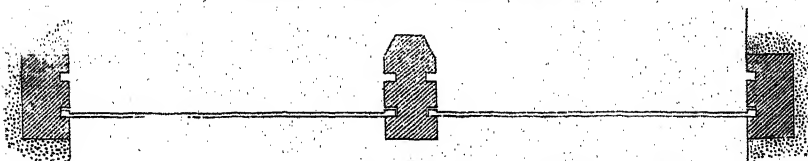


Fig. 2.—Horizontal Section of Fry Guard, showing one set of panels in position.

One set of panels can then be pulled out and left to dry while the other set is in place. Once dry, weeds and dirt are easily shaken or brushed off the wire netting.

Compliance with the provisions of the law respecting gratings and fry guards sometimes puts a miller to more or less inconvenience in the prosecution of his industry. The Department have accordingly been empowered to grant exemptions as to more or fewer of these provisions where and for such periods as they consider necessary for effective working. In the case of a mill worked by a turbine, there is no power to exempt the miller wholly from his obligation as to fry guards, but he may be allowed to put his fry guard at some specified place other than the intake of the head race.

When a miller is called upon by the Conservators to instal gratings, etc., which he thinks will prejudice his business, it is open to him to apply to the Department for inspection with a view to exemption, and if he does this and informs the Conservators the latter may be expected to suspend further action until the decision of the Department is made known.

#### REGULATION OF SLUICES, WASTE GATES, ETC., AND WATERCOURSES OF MILLS ON RIVERS FREQUENTED BY SALMON.

The intention of the law is to provide the maximum facility for the passage of fish over or past mill weirs, so long as milling power is not hindered except between 6 p.m. Saturday and 6 a.m. Monday. In the infinite variety of mill installations, the wording of Acts is necessarily somewhat general and the combined effect of successive provisions somewhat obscure, but so long as the miller does whatever local conditions permit to get fish safely over or past his weir, and consults the Conservators on any doubtful point, no man is likely to hinder him in the lawful prosecution of his industry.

In general effect, if there is a fish pass or other effective passage in his weir a miller must, during the weekly period above mentioned, or at other times when the mill is not working, do everything possible in the way of closing sluices and waste gates to force water through the fish pass or other equivalent part of the weir. This requirement is subject to the necessity of gathering water for the resumption of milling on Monday morning, or of drying the head race, when necessary, for the repair of power apparatus or watercourses. Subject to the same safeguard of milling power, if the weir is impassable by fish, the miller must, during the like periods, keep open the weir sluices, if such exist; or, if there are no weir sluices, and if the waste gate above the wheel (or turbine) affords a practicable passage, he must leave that waste gate, and any sluices above it, open. Obviously, this last provision has no application to mills at which the obligation of maintaining a grating, at the point of divergence of the head race has been enforced.

In the administration of the law in these matters, a miller who neglects to keep his head race staunch, or to regulate his sluices

according to his requirements, and thus diverts from the river more water than he uses, cannot expect the most sympathetic treatment.

#### TAKING FISH IN MILL RACES, ETC.

Poaching on mill premises is one of the most pestilent offences with which Conservators have to deal, and millers who do not take effectual means to prevent it, though themselves wholly innocent of illegal intention, are sure of endless trouble. No person may take fish by any means whatsoever, except by rod and line, in any of the watercourses appertaining to a mill, and if, in contravention of the above, fish are taken by shutting down any gate or sluice which is under the exclusive power of the miller, and the actual offender is not known or cannot be found, the miller is responsible, should the Magistrates have reasonable ground for believing that the offence was committed (1) with his knowledge or connivance, or (2) with the knowledge or connivance of the person in charge of the mill or by a person in the miller's employment or control, or (3) because the miller did not take reasonable precaution to prevent it. Drying a mill race by means of a temporary dam, for the purpose of taking salmon or trout, is also an offence, for which, however, responsibility does not necessarily rest on the miller.

#### ASSISTANCE BY THE DEPARTMENT IN THE CONSTRUCTION OF FISH PASSES, GRATINGS, AND FRY GUARDS.

In view of the great increase in recent years of the public interest in the salmon fisheries, by the development of the drift-net and other netting industries practised in tidal waters under Common Law right, the Department have recognised that it may be equitable in certain cases to apply public money to the assistance of millers who are called upon to comply with the provisions relating to fish passes, gratings and fry guards. These provisions were enacted at a period when the milling industry was in fairly prosperous condition, but in many cases have not been enforced until recent times, when the industry could ill afford any outlay additional to the cost of maintaining plant.

Under normal financial conditions the Department are usually in a position to afford the advice of expert engineers in the design and construction of fish passes, gratings and fry guards, and have on a few occasions made small contributions to the cost of carrying out the work. Though at present, owing to reduction of income and staff, no general prospect of assistance, even by way of engineering advice, can be held out, the Department are prepared to consider most carefully any applications for assistance that may be made to them.



## POLLUTION.

The only Act which specifically aims at the prevention of pollution of rivers by mills, factories, etc., is the Pollution of Rivers Act, 1876, which millers would do well to consult. Its administration is not specially assigned to the Fishery Authority, except to the extent that the Department or a Board of Conservators, who appear to be "persons" within the meaning of the Act, may, if aggrieved, institute proceedings for default of certain of its provisions.

Fishery Law, however, provides that no person shall throw, empty, or cause to run or flow into any river (including its tributaries) or lake any dye-stuff, or other deleterious or poisonous liquid, or shall throw into such river or lake any lime, spurge, or deleterious matter, or shall steep in such river or lake any flax or hemp. This prohibition applies only to matter (solid or liquid) which is actually deleterious or in a state poisonous to fish or other animals using the water, but it is no defence to a prosecution that the matter, if poisonous in itself, becomes immediately innocuous owing to the volume of the water in the river.

Sawdust and any other solid matter, not necessarily poisonous, which tends to form a coating over the natural bed of a river, is highly deleterious, since it makes the bottom useless for spawning purposes and barren of the small animal life on which trout and the fry of salmon largely subsist. Millers should take every precaution to keep such substances out of the river.

Flaxwater is well recognised, in the administration of Fishery Law, as a deleterious or poisonous liquid, and, strictly speaking, anyone who allows flaxwater to pass into a river, stream or lake is liable to punishment; but in certain districts, in order to minimise interference with the flax industry as far as possible, the Conservators allow flax ponds to be run off at times when, in their judgment, the water is high enough to render the effluent not actually destructive to fish. This is a very considerable concession, since even in very dilute form, flaxwater seems to make it impossible to take fish with rod and line; and owners of flax ponds should take the greatest care not to allow their dams to leak at any time or to be cut except when the local officer of the Board of Conservators signifies that it may be done. Millers have been known to steep flax in their mill races, under the impression that there is no prohibition of such practice. This is an error, since mill races have been held to be tributaries and therefore come within the meaning of "river."

## APPENDIX I.

## SECTIONS OF FISHERIES ACTS REFERRING TO MILLS.

<i>Mill Weirs</i> .. ..	$\left\{ \begin{array}{l} 5 \text{ \& } 6 \text{ Vic., Cap. 106, Sec. 63.} \\ 11 \text{ \& } 12 \text{ Vic., Cap. 92, Sec. 20.} \\ 26 \text{ \& } 27 \text{ Vic., Cap. 114, Sec. 16.} \\ 26 \text{ \& } 27 \text{ Vic., Cap. 114, Sec. 31.} \end{array} \right.$
<i>Fish Passes in Mill Weirs</i>	$\left\{ \begin{array}{l} 5 \text{ \& } 6 \text{ Vic., Cap. 106, Sec. 63.} \\ 5 \text{ \& } 6 \text{ Vic., Cap. 106, Sec. 64.} \\ 11 \text{ \& } 12 \text{ Vic., Cap. 92, Sec. 20.} \\ 26 \text{ \& } 27 \text{ Vic., Cap. 114, Sec. 16.} \\ 26 \text{ \& } 27 \text{ Vic., Cap. 114, Sec. 31.} \end{array} \right.$
<i>Weekly Closure of Sluices</i>	13 \& 14 Vic., Cap. 88, Sec. 39.
<i>Gratings</i> .. ..	$\left\{ \begin{array}{l} 5 \text{ \& } 6 \text{ Vic., Cap. 106, Sec. 76.} \\ 26 \text{ \& } 27 \text{ Vic., Cap. 114, Sec. 30.} \\ 32 \text{ Vic., Cap. 9, Sec. 4.} \end{array} \right.$
<i>Fry Guards</i> .. ..	$\left\{ \begin{array}{l} 5 \text{ \& } 6 \text{ Vic., Cap. 106, Sec. 76.} \\ 26 \text{ \& } 27 \text{ Vic., Cap. 114, Sec. 30.} \\ 32 \text{ Vic., Cap. 9, Sec. 4.} \end{array} \right.$
<i>Exemptions</i> .. ..	32 Vic., Cap. 9, Sec. 4.
<i>Turbine Mills</i> ..	26 \& 27 Vic., Cap. 114, Sec. 30.
<i>Fishing in Mill Races</i> ..	$\left\{ \begin{array}{l} 5 \text{ \& } 6 \text{ Vic., Cap. 106, Sec. 75.} \\ 5 \text{ \& } 6 \text{ Vic., Cap. 106, Sec. 78.} \end{array} \right.$
<i>Fishing Mill Dams</i> ..	$\left\{ \begin{array}{l} 5 \text{ \& } 6 \text{ Vic., Cap. 106, Sec. 56.} \\ 26 \text{ \& } 27 \text{ Vic., Cap. 114, Sec. 10.} \\ 26 \text{ \& } 27 \text{ Vic., Cap. 114, Sec. 16.} \\ 26 \text{ \& } 27 \text{ Vic., Cap. 114, Sec. 44.} \end{array} \right.$
<i>Fishing near Mill Dams..</i>	$\left\{ \begin{array}{l} 13 \text{ \& } 14 \text{ Vic., Cap. 88, Sec. 37.} \\ 26 \text{ \& } 27 \text{ Vic., Cap. 114, Sec. 16.} \end{array} \right.$
<i>Pollution of Rivers</i> ..	$\left\{ \begin{array}{l} 5 \text{ \& } 6 \text{ Vic., Cap. 106, Sec. 80.} \\ 39 \text{ \& } 40 \text{ Vic., Cap. 75.} \end{array} \right.$

## APPENDIX II.

## FISHERY DISTRICTS WITH NAMES AND ADDRESSES OF CLERKS.

Name of District	Extent of District All rivers, lakes and tributaries flowing into sea between	Name and Address of Clerk
DUBLIN ..	Skerries and Wicklow ..	B. J. Newcombe, 110 Grafton Street, Dublin
WEXFORD ..	Wicklow and Kiln Bay (east of Bannow Bay)	Michael Donovan, Fishery Office, Enniscorthy
WATERFORD ..	Kiln Bay and Helvick Head	J. H. Jones, 17 Beresford Street Waterford
LISMORE ..	Helvick Head and Ballycotton	Thomas Drohan, Fishery Office Mallow
CORK (Cork Division)	Ballycotton Head and Barry's Head (east of Oyster Haven)	G. Futter, 2 Waugh's Terrace, Sunday's Well, Cork
CORK (Bandon Division)	Barry's Head and Galley Head	J. Byrne, Fishery Office, Bandon
SKIBBEREEN ..	Galley Head and Mizen Head	P. O'Shea, Curragh, Skibbereen
BANTRY ] ..	Mizen Head and Crow Head	J. E. Warner, Reendesert, Bantry
KENMARE ..	Crow Head and Lamb Head	Thomas G. Sleath, Kenmare
WATERVILLE ..	Lamb Head and the most Westerly point of Kells Bay	R. O. Sloane, Waterville, Co. Kerry
KILLARNEY ..	The most westerly point of Kells Bay and Dunmore Head (the Blaskets inclusive)	J. Hensey,   Fishery Office, Killorglin
LIMERICK ..	Dunmore Head and Hags Head	H. Bindon Alton, 76, George Street, Limerick
GALWAY ..	Hags Head and Sea Point of boundary between Townlands of Keeraunnagark South and Banraghbaun South, south-east of Cashla Coastguard Station	George Lyons, 1 Mill St., Co. Galway
CONNEMARA ..	Sea point of boundary between townlands of Keeraunnagark South and Banraghbaun South, south-east of Cashla Coastguard Station and Slyne Head	W. N. Milne, Schrahallia Lodge, Cashel, Co. Galway
BALLINAKILL ..	Slyne Head and Pigeon Point	Dacre Tynan, Leenane, Co. Galway
BANGOR ..	Pigeon Point and Benwee Head	William Nixon, Inishower, Newport, Co. Mayo
BALLINA ..	Benwee Head and Coonamore Point	E. F. Atkinson, Ballina
SLIGO ..	Coonamore Point and Mullaghmore	J. Graham, Castle Street, Sligo
BALLYSHANNON	Mullaghmore and Rossan Point	R. A. Hamilton, Ballyshannon
LETTERKENNY	Rossan Point and Malin Head	C. A. Flattery, Letterkenny
LONDONDERRY	Malin Head and Downhill boundary	<i>Vacant</i> , Fishery Office, Londonderry
COLERAINE ..	Downhill boundary and Portrush	T. J. English, Petty Sessions Office, Lisburn
BALLYCASTLE	Portrush and Donaghadee	Charles Forbes, Bushmills, Co. Antrim
DUNDALK ..	Donaghadee and Clogher Head	Oswald Hardy, Fishery Office, Dundalk
DROGHEDA ..	Clogher Head and Skerries	John Kealy, Courthouse, Drogheda

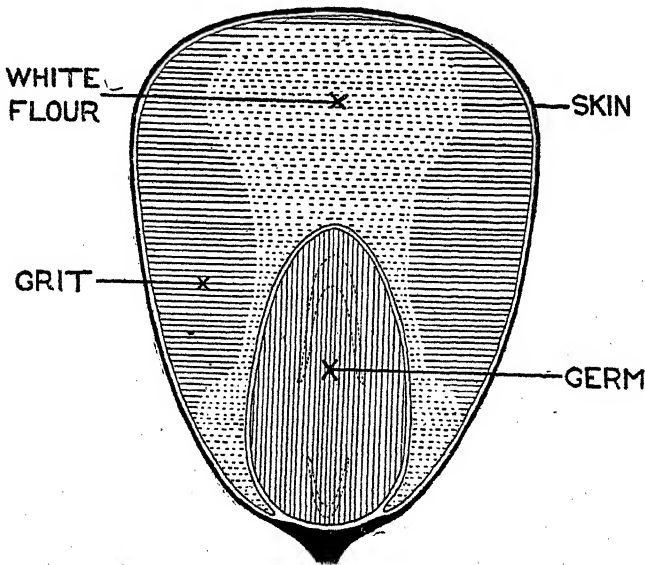
## MAIZE PRODUCTS.

In a section of grain of maize, four well-defined substances can be easily distinguished, viz. :—

1. The skin, or bran.
2. The grit, or “granulated meal.”
3. The white flour.
4. The germ.

When the grain is torn by suitable machinery, these four can be separated roughly by the use of sieves and fans.

A longitudinal section of a grain of maize is shown in the following diagram :—



The following analyses show the chemical composition of the various portions into which a sample of maize was separated. These figures must not be regarded as a standard. The samples were taken by the Department, but there is no guarantee that the separation was in any degree perfect. Accordingly it may be expected that other samples will show very different results. For example, the flour in this case must have contained a large portion of the germ, while the germ must have contained a portion of the flour and grit.

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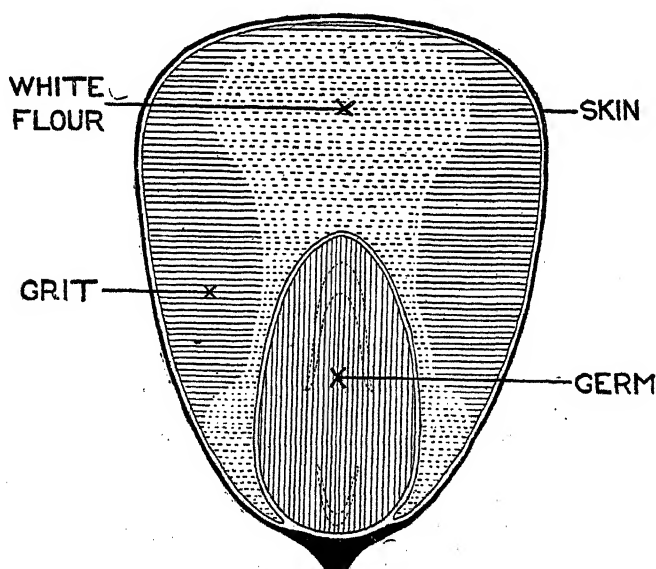
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A longitudinal section of a grain of maize is shown in the following diagram :—



The following analyses show the chemical composition of the various portions into which a sample of maize was separated. These figures must not be regarded as a standard. The samples were taken by the Department, but there is no guarantee that the separation was in any degree perfect. Accordingly it may be expected that other samples will show very different results. For example, the flour in this case must have contained a large portion of the germ, while the germ must have contained a portion of the flour and grit.

		Whole maize.	Bran.	Granulated meal.	Flour.	Germ.
Oil .. ..	..	4.63	4.93	1.29	6.10	14.28
Albuminoids ..	..	9.80	8.40	8.90	8.79	13.47
Carbohydrates ..	..	70.71	65.61	74.57	71.62	56.22
Woody fibre ..	..	2.07	6.37	.63	1.50	5.30
Mineral matter ..	..	1.45	1.60	.75	2.40	3.75
Moisture .. ..	..	11.34	13.09	13.86	9.59	6.98
		<u>100.00</u>	<u>100.00</u>	<u>100.00</u>	<u>100.00</u>	<u>100.00</u>
* Food units ..	..	106.79	98.94	100.05	108.85	125.60

The composition of whole maize, too, varies considerably. Of several samples analysed in the Department's Chemical Division the percentage of oil varied from 4 per cent. to 5 per cent. The maize from which the above analyses were made was South American. Of the 600,000 tons of maize annually imported into Ireland, about 90 per cent. comes from South America.

In Ireland maize is used mainly as food for stock, but to some extent as human food. In most cases the grain is ground into meal without any separation into its parts or abstraction of oil. The product is known as "STRAIGHT RUN MAIZE MEAL" or "WHOLE MAIZE MEAL," that is, genuine maize meal. For many years, however, a few millers have separated the gritty portion, which they sell under the name of "GRANULATED MEAL" or under a fancy name. As a table food granulated meal appears to be much appreciated. Granulated meal, though it often contains a small percentage of oil, presents so attractive an appearance that in some districts where it is well known farmers buy it as a food for stock in preference to the straight run or whole maize meal. Their preference extends to their willingness to pay a higher price, notwithstanding the fact that granulated maize meal is poorer than whole ground maize both in oil and albuminoids, though it is richer in starch.

In some mills the portion containing the germ is pressed or otherwise treated to extract the oil, which is sold for commercial purposes. The cake left from the process is ground with the bran, the flour is added and the product sold as a food for stock as "GERM MEAL." Germ meal does not appear to be appreciated by farmers in Ireland, as though sold at less per ton than whole ground maize the demand for it by stock feeders is very limited. A sample of germ meal taken by an officer of the Department gave the following analysis:—

Oil .. ..	..	..	..	5.00
Albuminoids ..	..	..	..	18.55
Carbohydrates ..	..	..	..	58.59

\*(The number of food units is found by adding to the percentage of carbohydrates  $2\frac{1}{2}$  times the percentage of oil and albuminoids. The number of food units is useful in comparing the cost of two or more foods, but too much reliance should not be placed on this method of valuation.)

This appears to be a good food if used as part of a ration for stock, and it is a mistake to let it go to Great Britain, where it is probably made into compound feeding cake and, doubtless, part of it returned to Ireland in this form.

But all manufacturers of granulated meal do not extract oil from the germ and make germ meal. When the miller also carries on trade in the sale of whole ground maize he may dispose of the germ and bran by mixing it with whole ground maize. Thus we get a meal richer in oil than whole ground maize. Many samples of maize meal taken by the Department's inspectors have shown an oil content quite above the normal. These may doubtless be accounted for as just described. Such meal is sold as maize meal or Indian meal. It would be better to sell it under a name which indicates its nature or mode of manufacture, such for example as "**COMPOUND MAIZE MEAL.**" The quantity of such meal, however, on the market is comparatively small.

A sample of compound maize meal made as described above was found to contain 6.54 per cent. of oil as compared with 4.63 per cent. in the whole maize.

There is still another method of treating maize and one of great and growing importance. The grain is torn and the chief constituents roughly separated as already described. The part containing the germ is heated and pressed to expel a portion of the oil. The resulting germ cake is ground up and mixed with the granulated portion and the flour, the product being sold as a meal for stock. It is the sale of this meal as maize meal or Indian meal that has given rise to complaints from several sources. Very large quantities of such meal are now made and the amount is likely to increase. For present purposes we may describe this product as "**OIL-EXTRACTED MAIZE.**"

There is a parallel between the extraction of oil from maize and from linseed. Linseed oil and maize oil are both required in the manufacturing or other industries, and fetch higher prices for these purposes than the farmer need pay for oil to feed stock. As oil-extracted linseed can be sold cheaper than whole ground linseed, so oil-extracted maize can be sold cheaper than whole ground maize. The law (Fertilisers and Feeding Stuffs Act, 1906, Sec. 1) requires that vendors must give the purchaser a guarantee on the invoice as to the percentage of oil and albuminoids in linseed cake or linseed cake meal. Vendors of oil-extracted maize must do likewise.

Unfortunately, though the makers give this guarantee and so conform to the law, retailers of such meals for the most part ignore or neglect their obligation in this respect. Moreover the farmer who buys from a local merchant pays little or no heed to the warnings given him by the Department and by the agricultural instructors to see that the law is observed. If he would act on the advice given him and report cases in which the vendor fails to give a proper invoice proceedings could be instituted. There is this, however, to be said



in extenuation of the farmer's attitude, that whole ground maize and oil-extracted maize do not differ so much as do whole linseed meal and linseed cake meal. Moreover the extraction of oil from linseed is the rule while the extraction of oil from maize is as yet the exception. The farmer is not therefore so well informed nor so alert in the one case as in the other. But so long as proper invoices are given the sale of oil-extracted maize is a legitimate business and it cannot be stopped. Moreover the extraction of oil from maize and its sale at a high price should provide the farmer with a cheaper meal for his stock. The oil-extracting process therefore may be an advantage to agriculture as it is to manufacturing industries.

Oil-extracted maize is not so rich a feeding stuff as whole maize meal, but neither is it so poor as is sometimes represented. The following are the analyses of two samples :—

		Whole maize.	Oil-extracted maize.
Oil	.. ..	4.63	2.50
Albuminoids	.. ..	9.80	10.06
Carbohydrates	.. ..	70.71	71.75
Food units	.. ..	106.8	108.15

It will be observed that though the percentage of oil is lower than that of albuminoids and carbohydrates (mainly starch) is slightly higher in oil-extracted meal than in whole maize.

Oil-extracted maize meal as a commercial article is usually sold with a guarantee of  $2\frac{1}{2}$  per cent. oil and 9 per cent. albuminoids. Very few of the samples analysed have been found to contain so low a percentage of oil as 2.5 per cent. On chemical grounds such meal appears to be a good food as part of a ration which includes cake for milch cows or for fattening bullocks. Owing to its low percentage of oil it may not give equally good results when fed to young stock, such as calves, especially when it forms the chief ingredient of the ration. But too much may be made of the evidence based solely on chemical analysis. Accurate observation in practice is the best test, and the Department therefore are carrying out trials on the feeding of pigs, in which whole maize, oil-extracted maize and granulated meal are being tested.

As already indicated the extraction of maize oil is a legitimate process, and so is the sale of oil-extracted meal, if sold for what it is and with statutory invoice stating the percentage of oil and of albuminoids. If the price of maize oil for industrial purposes remains good the oil-extracting industry will increase, and if not taken up by Irish firms a new industry may be lost to this country.

*Copies of this article in Memorandum form (A.B. Memo. No. 19) may be obtained free of charge and post free on application to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Letters of application so addressed need not be stamped.*

## "CHAMBRAGE" IN OYSTERS.

By R. SOUTHERN, B.Sc., *Fisheries Branch, Department of Agriculture and Technical Instruction.*

If the inner surfaces of fresh oyster shells are examined, in many cases it is found that the shell is not solid. One or more cavities may occur in the substance of either of the two valves, bounded internally by a thin layer of nacre, or mother-of-pearl. These cavities are filled with a clear, odourless, and usually aseptic liquid. To this chambering of the shell, cultivators of the oyster in France have applied the name "chambrage."

The subject has recently been investigated by MM. C. Heulbert and Galaine,\* of the Muséum d'Histoire Naturelle, Paris, at the oyster *parcs* in the Bay of Cancale, and their observations may be briefly summarised as follows:—The chambers, one to five in number, occur in the lower, or concave valve, but occasionally they are found in the upper or flat valve. Almost invariably the liquid in the chambers is clear, odourless, and aseptic. It contains magnesium chloride in solution, in quantity greater than occurs in ordinary sea-water, with a small proportion of magnesium sulphate. If the chamber is punctured when the oyster is being opened, as frequently happens, this liquid imparts a slightly acrid flavour to the oyster. Several species of marine worms, belonging to the order *Polychæta*, live in tunnels which they bore in the thickness of the shell. Occasionally one of the tunnels penetrates into a chamber, and when the worm dies, or for some reason leaves the tunnel, a certain amount of mud from the sea floor penetrates into the chamber. The mud contains decaying organic matter and putrefactive bacteria, and fermentation takes place, with the formation of sulphuretted hydrogen. If the chamber is pierced when the oyster is opened, the foul-smelling mass is precipitated over the oyster, rendering it quite uneatable.

Several different kinds of *Polychæta* bore tunnels in oyster shells, but the one most frequently met with at Cancale was an undetermined species, probably belonging to the genus *Sclerocheilus*. It bores elongated U-shaped tunnels between the layers of nacre, starting from the external edge of the shell, and extending more or less towards the middle. When the worm dies or vacates its tunnel, the latter is immediately invaded by mud, and the tunnel becomes a centre of intense microbic activity, giving rise to the appearance of yellow, brown, or even black patches on the inner surface of the shell, even in cases where the chambers are not penetrated.

\* Journal Officiel de la République Française, 25 Decembre, 1915, p. 9491.

Two hypotheses have been evolved by oyster cultivators to account for the formation of the chambers, and both are dismissed as untenable by the authors. One hypothesis holds that the chamber is formed by the oyster as an act of defence, to isolate a quantity of mud which has accidentally entered the shell. The absence of any solid matter from the great majority of the chambers negatives this view. The second hypothesis is that chambered oysters are emaciated and without flavour, and have formed the chambers because the space between the valves is too great.

The authors believe that the chambering of the shell is not a pathological accident, but an ancestral characteristic. It is strongly developed in certain extinct genera of bivalve mollusca, such as *Hippurites*, *Radiolites*, *Caprinella*, etc., and the regular chambering of the shell in many extinct and recent Cephalopoda is regarded as homologous. It is not to be considered surprising, therefore, that this characteristic is exhibited in a vestigial condition in living oysters.

With a view to ascertaining the species of worms which bore tunnels in oyster shells, and convert "chambrage" from a harmless into an odoriferous condition, a number of oysters were examined at the Department's experimental oyster station at Ardfry, on Galway Bay. Four different sets of oysters were collected—(1) Relaid oysters from the sea pond, on a bottom of muddy sand and gravel; (2) oysters from the east shore of New Harbour, on a bottom of muddy sand, shells, gravel, and stones; (3) oysters from Mweeloon Bay, above the weir, on a bottom of clean broken shells; (4) oysters from Mweeloon Bay, below the weir, on a bottom of muddy sand, shells, and *Zostera*. The three last sets of oysters are either wild, or the descendants of planted oysters.

All the oysters examined for the data given below were fairly large, probably four or more years old. The results obtained varied according to the source from which the oysters came.

Of oysters taken from the pond 36 were examined, and, with 2 exceptions, all were more or less chambered.

**Oysters from the Pond.** The curved (lower) valve contained 1-6 chambers, sometimes side by side, but usually superimposed.

Chambers were also frequently present in the thin flat (upper) valve. Worm tunnels were abundant but small. The only worm present, capable of boring the shell, was a small *Polychæte*, *Polydora ciliata* (Johnston), often occurring in large numbers. Sometimes the tunnels contained no worms, and in that case they were full of black, rather smelly mud. In one shell which had several chambers and many tunnels, two chambers were superimposed, and the lower or external one had been pierced by a tunnel, and was full of foul-smelling mud.

Of oysters taken from New Harbour 29 were examined and of these 16 were chambered, 13 were not, and 1 Oysters from was without either chambers or tunnels. 12 New Harbour. oysters were examined for worms, and 11 had one or more large tunnels. Two species of boring worms were obtained, *Dodecaceria concharum*, Oersted, and *Polydora hophura*, Claparède. The latter species makes very large and long tunnels, described below. In 3 shells the tunnels of the *Polydora*, containing the living worms, pierced small chambers, without producing any objectionable smell. Several other shells were penetrated by large and small tunnels in which the worm had been replaced by foul black mud, but as the chambers were not entered, the edible value of the oysters was not impaired. In 3 oysters out of the 29 the chambers contained mud more or less objectionable in smell.

Of the oysters taken from Mweeloon Bay above the weir, 40 were examined, and of these 25 were chambered, Oysters from 15 were not. One shell was so penetrated by the Mweeloon Bay, boring sponge *Cliona celata*, Grant, as to be quite above the rotten. 19 oysters were examined for shell Weir. parasites. Of these, 10 were quite free from tunnels, 7 had old, rather small tunnels full of mud but without worms, 1 had a large tunnel containing *Polydora hophura*, and 1 had a tunnel containing *Dodecaceria concharum*.

Of the oysters taken from Mweeloon Bay, below the weir, 26 were examined, and of these 17 were chambered, Oysters from 9 were not. 11 oysters were examined for shell Mweeloon Bay, parasites, and of these, 2 had no tunnels, 4 had below the empty tunnels, 3 had tunnels containing *Poly- Weir. ora ciliata*, and 3 had tunnels containing *Dode- caceria concharum*, one shell containing both species.

Comparing these results, it appears that chambrage is most frequent in oysters from the Pond (in 95 per cent. of cases), least frequent in oysters from New Harbour (55 per cent.). The latter do not differ much from oysters in Mweeloon Bay, above and below the weir (62 per cent and 65 per cent. of cases respectively). These figures support the prevailing opinion that chambrage occurs more frequently in cultivated than in wild oysters. It is probable that the absence of *Polydora hophura* and *Dodecaceria concharum* in the oysters from the Pond is due to the more variable conditions prevailing there, and especially to the frequent reduction of the salinity of the water by rain.

Turning now to the worms which form tunnels in the oyster shells, these are three in number, *Polydora ciliata*, *Polydora hophura*,

and *Dodecaceria concharum*. In general appearance the tunnels bored by these three species are very similar (Fig. 1). The internal

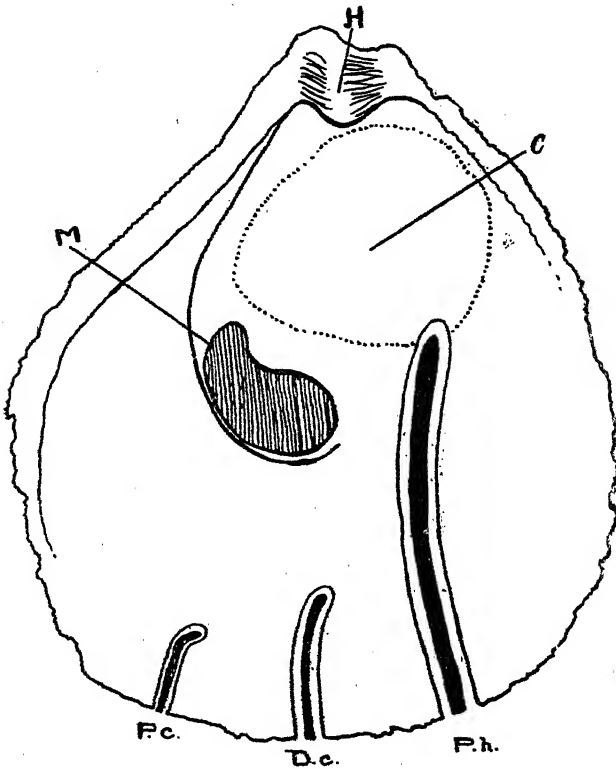


FIG. 1.—Inner surface of curved valve, showing relative lengths of worm tunnels.

C=position of chamber, indicated by dotted line; H=hinge; M=muscle attachment; P.c.=tunnel of *Polydora ciliata*; D.c.=tunnel of *Dodecaceria concharum*; P.h.=tunnel of *Polydora hoplura*.

layer of the oyster shell is composed of nacre, or mother-of-pearl, formed in thin laminae by the mantle of the oyster. Apparently the worm always commences to bore at the edge of the shell, where the newly-formed and still soft and flexible laminae provide a certain amount of shelter for the young worms. The tunnel then runs inwards towards the middle of the shell, keeping roughly parallel to the inner surface of the shell, and often lying entirely between two adjacent laminae. The tunnel then doubles back to the edge of the shell. It is thus U-shaped, the two limbs lying side by side, only separated by an incomplete narrow ridge of shell. Sometimes the tunnels appear to originate on the outer wall of the shell, but this is probably due to new laminae having been subsequently deposited by the oyster, carrying the edge of the shell beyond the point where the tunnel originated.

The size of the tunnels differs according to the species of worm, and the age of the individual which makes it. By far the largest tunnels are made by *Polydora hoplura* (Fig. 1, P.h.). They may be 50 mm. (2 inches) long, and correspondingly broad (the measurements indicate the distances which the tunnel penetrates, i.e., one half the total length of the tunnel). The *Polydora*, when undisturbed, lies in the tunnel with its head near one entrance (Fig. 2),



FIG. 2.—Tunnel of *Polydora hoplura*, with worm *in situ*.

and with its tentacles waving slowly in the water in search of food particles. *Polydora ciliata* (Fig. 1, P.c.) forms small tunnels, up to 15 mm. in length ( $\frac{3}{5}$ ths of an inch), and its way of living closely resembles that of *P. hoplura*. The tunnels of *Dodecaceria concharum* (Fig. 1, D.c.) are intermediate in length, 20 mm. long ( $\frac{4}{5}$ ths of an inch). It is very seldom that the tunnels of the two last-named species penetrate as far as the chambers. This frequently occurs, however, in the case of *Polydora hoplura*, and this species does far more damage than the other two. It is only when the penetrated chamber has become full of mud, and when it lies close to the inner wall of the shell in such a position that it would be pierced by the oyster knife, that the oyster becomes a source of loss to the vendor, and an object of disgust to the consumer. Such was the case in only 8 out of about 300 oysters which I examined at Ardfry. MM. Heulbert and Galaine state that the worm most frequently found boring in oysters in the Bay of Cancale is probably a species of *Sclerocheilus*, but it was not determined more precisely. *Sclerocheilus minutus*, Grube, has been found by de Saint-Joseph

commonly occurring in old oyster shells on the French coast. The same species is found rarely on the west coast of Ireland, but so far it has not been obtained from oyster shells.

The three theories, outlined above, which have been advanced to explain the occurrence of chambrage, are none of them very satisfactory. The first, that the oyster forms the chamber in order to rid itself of particles of mud which have obtained entrance, was probably suggested by the presence of mud in those chambers which have been pierced by a worm tunnel, but it is negatived by the fact that the great majority of chambers contain only a clear liquid. The second theory, that chambers are only formed by sick and emaciated oysters, in order to reduce the volume of the shell cavity, may be true in a small number of cases, but it implies that a very high proportion of oysters have suffered from sickness, for there are very few large oysters which have not one or more chambers. The third theory, advanced by MM. Heulbert and Galaine, that the formation of chambers is a vestigial character, inherited from distant ancestors, and having no present function, is also unsatisfactory. Whilst similar vestigial and apparently useless characters are known to occur in the animal kingdom, it is generally characteristic of them that they are more highly developed in the young than in the adult stage, and, as shown below, this is not true of chambrage in oysters. Moreover, it is a policy of despair to describe a character as vestigial until it has been clearly shown to have no present function. The presence of lacunæ or chambers in the substance of a bivalve shell is a very negative character, which might have originated *de novo* many times in the ancestry of a species, and it is a large assumption that because chambers occur in the shells of living species and some far distant ancestor, that therefore they have persisted continuously without a break. Another strong argument against the genetic affinity of the various recent and fossil mollusca having chambered shells is the occurrence of this characteristic in groups of species widely separated in geological history, groups of which the common ancestor must have existed during or before the deposition of the earliest known fossiliferous strata.

A very cursory examination is sufficient to show that chambers are of more frequent occurrence, larger, and more numerous in large than in small oysters. In order to test this point more precisely, a number of oysters of known age were examined. Unfortunately the number was limited, and no oysters of known age over 4 years old were available. The oysters were collected in the spring, before the spatting season, and consequently were two or three months short of completing a year. For instance the oysters 'nearly 4 years' old were about 3 years 10 months, and had lived through three spatting seasons.

Age	No. of individuals examined	No. with chambers.
Nearly 2 years	27	4
Nearly 3 years	37	1
Nearly 4 years	27	5

The chambers in these oysters were all very small, and usually only one was present. Of the oysters recently examined for chambrage at Ardfry the great majority were more than 4 years old, probably 4-7 years old at least, and, as stated above, chambers were found in from 55 to 95 per hundred.

The evidence thus points to the conclusion that chambers are rare in oysters of less than 4 years of age, but that after that age is attained they increase comparatively rapidly in number and size. In forming any hypothesis to account for the formation and function of the chambers, these observations must be taken into consideration.

When an oyster is carefully opened it is seen that the body of the

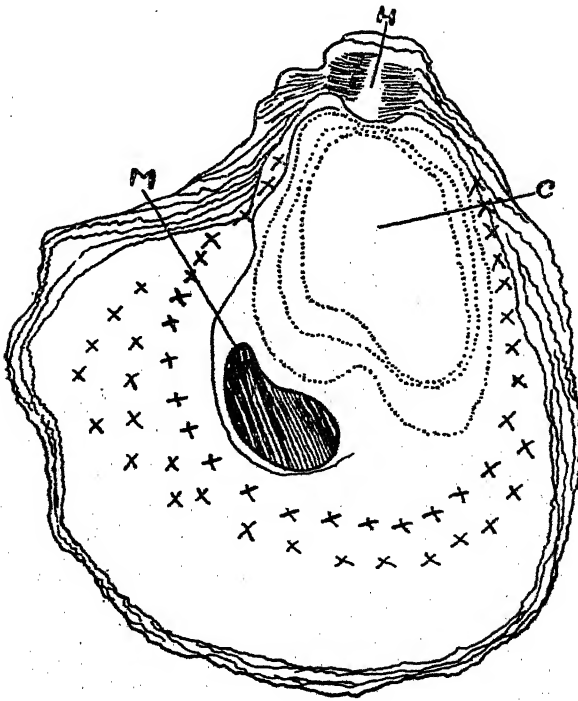


FIG. 3.—Inner surface of curved valve, showing position of chambers, and area of secondary thickening.  
**C**=position of 3 superimposed chambers, indicated by dotted lines; **H**=hinge; **M**=muscle attachment.  
 The crosses indicate the position of the thickened ridge composed chiefly of soft shell substance.



animal completely fills the cavity, the mantle lying in close contact with the pearly lining of the shell. If, any space remained unoccupied it might serve to retain irritant particles, and bivalves are notoriously hostile to such foreign bodies. It, then, for some reason the oyster suddenly ceased to occupy the whole of the cavity, a motive is supplied for its rapid reduction by means of the formation of a chamber, which necessitates the deposition of only a thin layer of mother-of-pearl.

After the spatting season, when the oyster has expelled the eggs or sperm, it is very considerably thinner than it was before, and in appearance it is watery, with very little or no fat on the body. Moreover, the part of the body enclosing the genital organs, which suffers the greatest diminution in size, lies in the deep part of the shell near the hinge (Figs. 3, 4, C), which may be called the



FIG. 4.—Section of both valves, passing through the hinge (H). C=gonadal cavity, with lines pointing to chambers in upper and lower valves.

“gonadal cavity.” It is suggested, therefore, that the formation of chambers in the shell of the oyster has for its function the rapid reduction in size of the gonadal cavity, in order to compensate for the loss of bulk in the body of the oyster, due to spatting. It is, of course, possible that the formation of the lamina of nacre which cuts off the chamber is not purposive but compulsory, being due to the mantle (which secretes the nacre) not being in contact with the wall of the gonadal cavity. It is very significant that chambers are only found in that part of the shell which surrounds the gonadal cavity (Figs. 3, 4, 5).

At Ardfry the oysters frequently form spat when they are 2 years old, rarely when they are 1 year old. But the eggs and sperm appear to be produced in greatest quantity when the oysters are 4 or 5 years old.\*

The figures given above, showing the proportion of oysters of different ages possessing chambers, though based on material not entirely satisfactory, are yet very significant. Out of 91 oysters,

\*Hoek, P.P.C. “Les organes de la génération de l’huttre.” *Tijds. d. Nederlandsche Dierkundige Vereeniging*, Suppl. Deel I., 1883, p. 254.

all less than 4 years old, only 10 (11 per cent.) were chambered, whilst out of 181 oysters of unknown age, but of which the great majority were more than 4 years old, 92 (70 per cent.) were chambered.

After spatting, the oyster is reduced in size, but in the following winter it again begins to grow rapidly, and the genital organ is swollen by the accumulation of eggs and sperm. Owing to the asymmetrical position of the genital organ, it is only the gonadal cavity which now needs to be enlarged, and it can only be enlarged and deepened by the vertical growth of the shell round the margin of the gonadal cavity, and its thickening in the area distant from the hinge, occupied by the gills and mantle. This thickened area is indicated in Fig. 3 by crosses, and is partly shown in section in Figs. 4 and 5. If the section of the shell

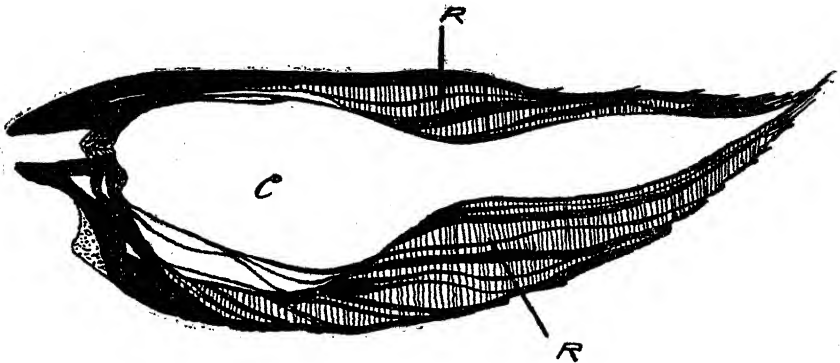


FIG. 5.—Section of both valves. The soft shell substance is indicated by vertical shading, the hard laminae of nacre by black lines more or less horizontal.  
R=thickened ridge; C=gonadal cavity, with chambers in shell above and below.

is examined more closely (Fig. 5) it will be seen that the shell is not homogeneous in structure. The thickened area especially, is composed of masses of soft shell (shown in the figure by vertical shading) separated by thin sheets of hard mother-of-pearl. Furthermore, these sheets can be traced from the thickened area towards the hinge, and some of them are continuous with the laminae forming the roofs of the chambers in the gonadal cavity. The same soft shell substance can be seen forming a large part of the thickened walls on each side of the gonadal cavity (vide Fig. 3). It seems very probable that the soft shell is deposited in the winter and spring, when the gonadal cavity has to be rapidly increased to accommodate the enlarging genital organ. Thus, in consequence of the alternating enlargement and reduction in size of the genital organ, the shell greatly increases in thickness, and it is well known that though oyster shells cease to grow in size after 6 or 7 years, yet they continue to grow in thickness during the whole life of the

oyster. In young oysters and in large oysters without chambers, the shell is usually very thin, the thickened ridge is inconspicuous, and there is only a small proportion of soft shell present.

For the elucidation of the problem of chambrage in oysters, the above hypothesis has the advantage of offering an explanation which is based on a normal and regular process in the life-history of the oyster, namely, reproduction.

#### SUMMARY.

1. Relaid oysters in the sea-pond at Ardfry more frequently contain chambers than the wild oysters from the sea.

2. Three species of boring *Polychæta* were observed, viz., *Polydora hoplura*, *Polydora ciliata*, and *Dodecaceria concharum*.

3. In only a very small proportion of cases were the oysters rendered uneatable through the invasion of malodorous mud into the chambers, by way of an empty worm-tunnel.

4. The worm-tunnels almost always have their openings at the edge of the shell, and often lie entirely between two adjacent laminae of the mother-of-pearl.

5. The tunnels made by *Polydora hoplura* are much the largest, and do most damage to the oysters.

6. The three theories which have been advanced to explain chambrage are dismissed as untenable and not in accordance with the facts.

7. Chambrage is much less frequent in oysters of less than 4 years' age (11 per cent. of cases) than it is in older oysters (70 per cent. of cases).

8. The body of the oyster occupies the whole of the cavity inside the shell.

9. The chambers occur in that part of the shell which lines the gonadial cavity and is occupied by the genital organs.

10. The part of the body of the oyster which occupies the gonadial cavity is greatly reduced in size after the spatting season, and again enlarges on the approach of the succeeding spatting season.

11. The hypothesis is advanced that the formation of chambers has for its function the rapid reduction in size of the gonadial cavity, so as to allow the emaciated body of the oyster, after spatting, to occupy the whole of the reduced cavity. In order to accommodate the renewed increase in size of the body at the approach of the succeeding spatting season, the gonadial cavity is again enlarged by the rapid deposition of soft shell substance in that part of the shell which surrounds the gonadial cavity. The alternation of hard and soft layers of shell substance is clearly shown in sections of the shell. On this hypothesis the continued increase in thickness of the shell, throughout the whole life of the oyster, is explained.

12. In young oysters, and in old oysters without chambers, the shell is relatively thin, with very little soft shell substance.

## IRISH MINERALS AND RAW MATERIALS : OPPORTUNITIES FOR DEVELOPMENT.

*[A Lecture delivered before the Scientific and Debating Society of the Royal College of Science for Ireland, on Wednesday, 12th April, 1916, by E. ST. JOHN LYBURN, A.R.C.Sc.I., F.G.S., Economic Geologist, Department of Agriculture and Technical Instruction, and Adviser on Mining Matters, Irish Land Commission. The Chair was occupied by Mr. T. P. Gill, Secretary of the Department.]*

### I.

The Committee of the Scientific and Debating Society have asked me to come here this evening to say a few words regarding "Irish Minerals and Raw Materials and Opportunities for Development." I propose to deal, firstly, with deposits which have, within recent years, been developed in this country, and secondly, to draw your attention to some mineral enterprises which are worthy of being carefully considered with a view to development.

Ireland is making some little progress with the development of her resources. It is true there have been failures ; but then there have been failures in other countries. In my opinion, the cause of failure of many of the Irish mining ventures seems to be the keen desire to erect machinery and raise ore before sufficient preliminary prospecting and investigating work has been carried out. Again, many explorations have been undertaken in this country with inadequate financial support. Mining work requires great reserves of capital. Some failures, too, are due to the heavy dead rents and royalties that have been paid for leases.

Considerable developments have taken place in the working of deposits of Barytes in this country. Two large Barytes. Companies are working this mineral in the County of Cork. At Gleniffe, Co. Sligo, this mineral is also being mined. Prospecting operations with a view to development are also being carried out in the County Sligo. Germany was a large exporter of Barytes. Barytes, as is well known, is used in the manufacture of Paint. (See Figs. 1 and 2.)

Diatomite or "Kieselguhr" is found near Toome, in County Antrim, and the "winning" of it near Toome-bridge and Portglenone has largely increased [ ("Kieselguhr.") in recent years. Diatomite is largely used for insulating purposes. (See Figs. 3, 4, 5, and 6.)

Deposits of Ochre are being worked in the Vale of Avoca, and within the last few years a mill has been erected for the treatment of this material, which is used in the manufacture of paint. (See Fig. 7.)

**Ochre.**

Turning to a brief consideration of coal-mining, it may be pointed out that developments have taken place in the Kilkenny Coalfields (see Figs. 8 and 9), although these mines are handicapped owing to the want of transport facilities. At Arigna, too, good work (see Fig. 10) is being done.

**Coal.**

At the Cork Industrial Conference, 1902, it was pointed out in the paper upon Irish Mineral Development that the manufacture of Cement could be developed in Ireland, owing to the amount of cement-making material in the country. Since then a large factory (see Fig. 11), with a capacity of about 40,000 to 45,000 tons per year, has been erected near Larne, Co. Antrim. The materials used are the white limestone or chalk and clay dredged from Larne Lough. A deposit of basalt occurs over the limestone. This basalt is crushed for road-making material and exported. Cement is also manufactured on a smaller scale near Drinagh, Co. Wexford.

**Cement.**

Prospecting operations for Molybdenite are being carried on near Roundstone, Co. Galway.

Steatite or Soapstone is at present being mined in the vicinity of Lough Gartan, Co. Donegal. This material is extensively used in the arts and manufactures. One variety, often described as French chalk,

**Steatite.**

is well known.

A factory for the manufacture of bricks from sand and lime has been erected within recent years at Newry. This is the only factory of its kind in Ireland.

**Sand-lime Brick.**

Carbide of Calcium, made from lime and Anthracite coal, or lime and coke, is made at two factories in this country, viz., at Collooney, Co. Sligo, and Askeaton, Co. Limerick. (See Fig. 12.)

**Carbide of Calcium.**

Considerable progress has taken place in the working of road-making materials, and well-equipped quarries, with up-to-date crushing machinery, are now being worked in this country. (See Figs. 13-17.)

**Road-making Materials.**

## IRISH MINERALS AND RAW MATERIALS.

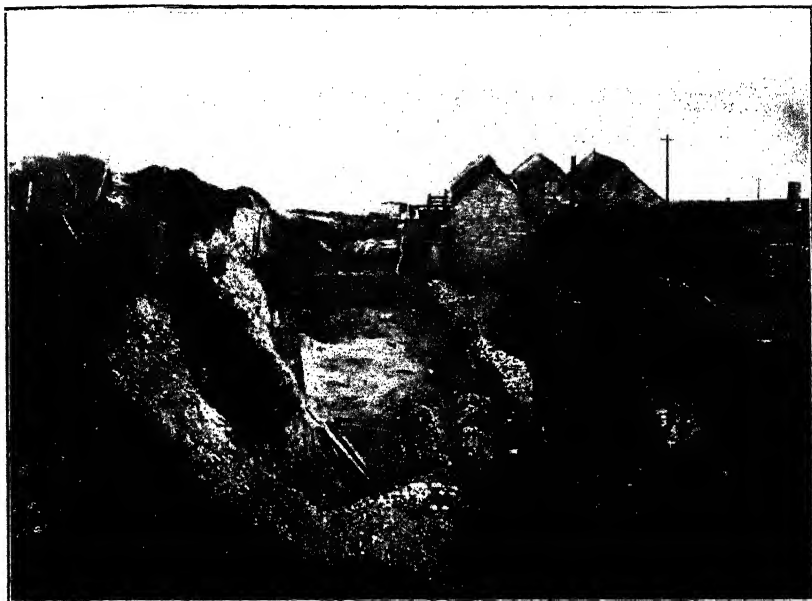


Fig. 1.—Duneen Bay Mines (Liverpool Barytes Co., Ltd.), Clonakilty, Co. Cork.

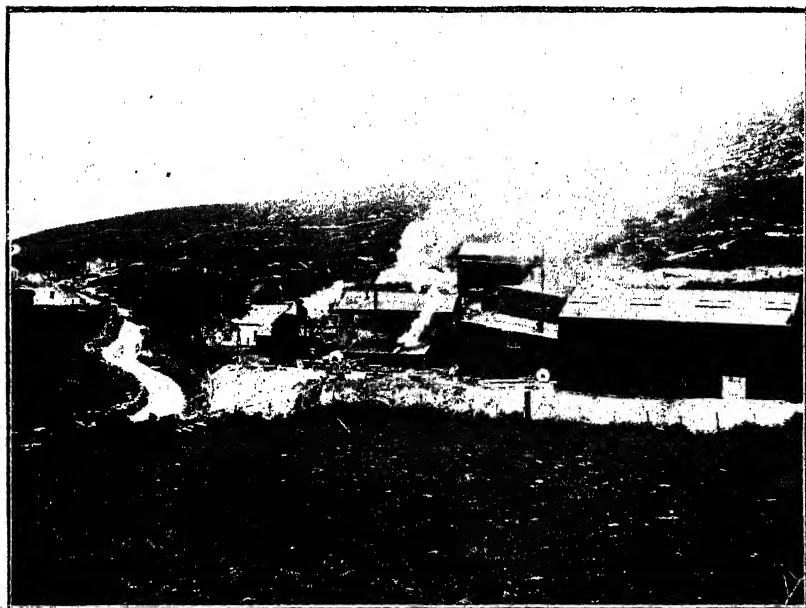


Fig. 2.—The Dunmanus Bay Barytes Mines (Ltd.), Ballydehob, Co. Cork.

## IRISH MINERALS AND RAW MATERIALS.

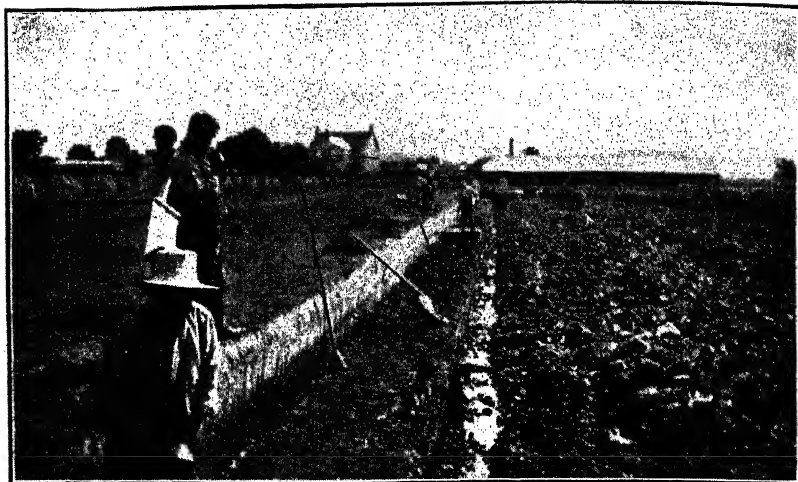


Fig. 3.—Kieselguhr Mines, Toomebridge, Co. Antrim (Messrs. J. & F. Grant. Head Office and Representative : Douglas A. MacCallum, F.C.S., Esq., 93 Hope Street, Glasgow). General view of workings showing bank.



Fig. 4.—Toomebridge Mines. View of drying fields showing Kieselguhr Blocks stacked for air-drying.

IRISH MINERALS AND RAW MATERIALS.



Fig. 5.—Toomebridge Mines. View of Kieselguhr mills and stock sheds.



Fig. 6.—Toomebridge Mines. Another view of drying fields—River Bann is seen on the left.



## IRISH MINERALS AND RAW MATERIALS.

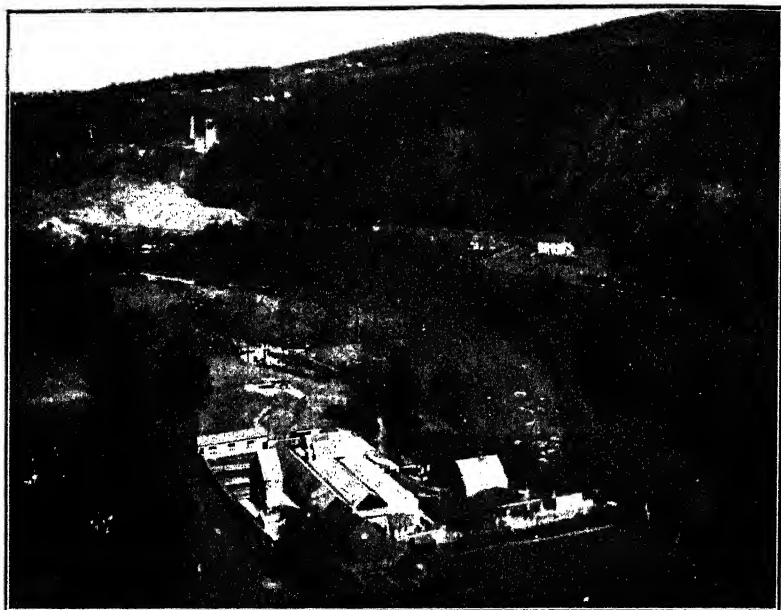
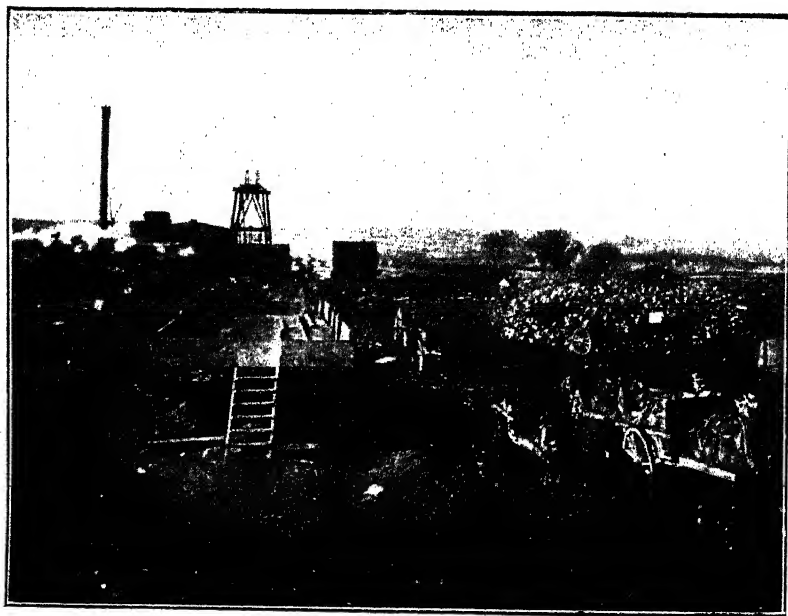


Fig. 7.—Ochre Works and Mines, Avoca, Co. Wicklow (The Via Gellia Colour Co., Ltd., Matlock Bath).



*Photo by]*

*[Poole, Waterford.*

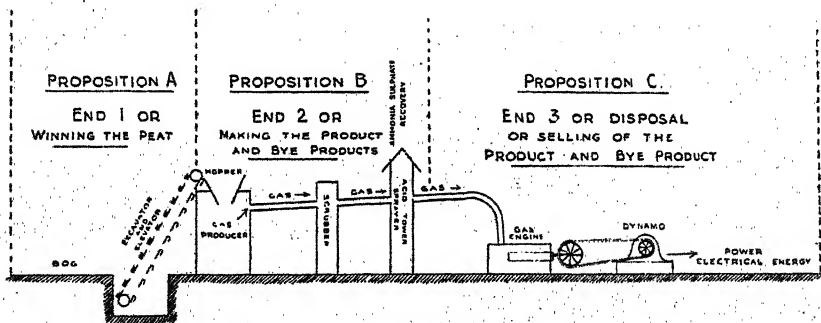
Fig. 8.—The Castlecomer Collieries, Co. Kilkenny.

This country is making some progress with regard to the utilisation of her Peat deposits. Peat Moss Litter is the principal material manufactured, and we have factories working at Ferbane, King's Co.; Edenderry, King's Co.; Maghery, Lough Neagh; Rahan, Tullamore; Enfield, Co. Meath; Castleconnell, Co. Limerick; Umeras, Monasterevan, King's Co.; and Portglenone, Co. Antrim. (See Figs. 18-25.)

At the Maghery works Peat is used for generating steam, in specially constructed fire-boxes, and electrical energy is produced for running a tramway.

Many are, no doubt, aware, that a producer gas plant using Peat instead of Anthracite coal, has been erected at Messrs. Hamilton Robb's Weaving Works, Portadown, Co. Antrim, with successful results. The fuel is brought from the Peat Moss Litter Works at Maghery by barge to Portadown.

The diagrammatic sketch below has been drawn to show the



different problems which present themselves in connection with the utilization of peat for power producing purposes. It will be noted that the sketch has been divided into three propositions or ends. Take propositions "B" and "C," or Ends "2" and "3" firstly. As regards Proposition "B," i.e., "Making the product and bye-product," this can be done, provided a suitable bog, high in nitrogen content, is selected. Proposition "C" or End "3," i.e., "Disposing or selling of the product, or bye-product," is a matter capable of solution by properly locating the site of the industry. Proposition "A" or End "1" or "winning" the Peat is the crux of the whole Irish Peat question from the point of view of a large industry being created.

The excavator and elevator on the sketch is purely diagrammatic, and must not be taken as the method for feeding Proposition "B." It is here that practically all efforts have failed. To supply "B" and "C," which must be run continually throughout the year, you must "win" a very large amount of Peat. (By

"winning" I mean you have to excavate and dry the Peat—Peat contains about 90 per cent. of water when dug at the bog.)

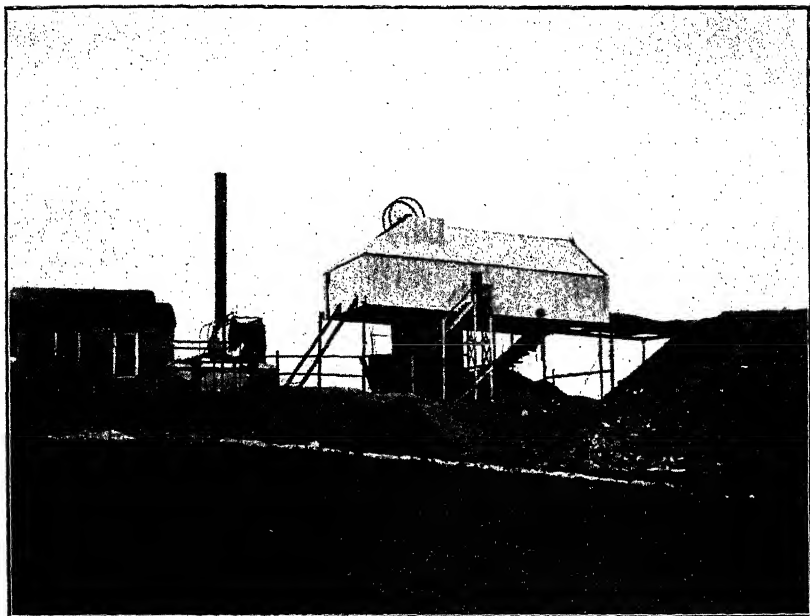
In this country there are practically only four months in the year in which Peat can be cut and dried by natural means. Attention must be at once called to the fact that for an industry of this description Black Peat is the most suitable material, but it deteriorates in value for this purpose when attacked by frost. In connection with the Peat Moss Litter industry frost has a beneficial effect on the cut sod, and cutting for Peat Moss Litter purposes can be carried on for a much longer period. The question of labour enters very largely into this Proposition ("C"), as you require three times the amount of labour for a period of four months as you would if you were carrying it on for the whole year. The difficulty of obtaining a very large amount of labour in a country like this, where labour is engaged in agricultural pursuits at a time it would be required for this purpose, can be well understood. The difficulties to be contended with will therefore be seen. This country awaits some process which will give the output required to make the installation of a plant of this description worth while. The farmers of the country could then obtain nitrogen in the form of sulphate of ammonia, and also electrical power, which probably could be used by them in their agricultural pursuits. Certain other bye-products could also be recovered.

At the Producer Gas Plant, Schweger Moor, Osnabrück, Germany, the Germans overlooked the important point of "winning," and at the time of my visit there, in May, 1913, were making arrangements to try new excavating machines. Arrangements were made for me to inspect these machines in August, 1914, but the outbreak of hostilities prevented this.

The German Government erected a Peat-burning Steam Power plant at Zentrale, Aürich, north-west Germany, for the purposes of supplying electrical energy to help in the colonising of a large bog district. They also had difficulty at first, regarding the "winning" and had, I understand to resort to coal. They, however, claim that they have got over the difficulty by the erection of huge storing sheds.

One reads a large amount of literature regarding what is being done on the Continent in connection with the utilisation of Peat. I have on two occasions visited Germany, France, Holland, Denmark, Sweden, and Norway, to investigate what they are doing, but I did not see any mechanical process which could be successfully introduced into this country. Indeed, so far as experience has proved, the Irish turf worker with his "slane," is able to cut turf cheaper than the machinery which is used on the Continent. The Dutch system of "hand-cutting" Peat for moss litter purposes has been introduced by the Department into two factories in Ireland, with successful results.

## IRISH MINERALS AND RAW MATERIALS.



*Photo by]*

*[Poole, Waterford.*

**Fig. 9.—The Colliery (The New Irish Mining Co., Wolfhill, Athy).**



**Fig. 10.—Arigna Mines. View of level, etc. (Arigna Mining Co., Drumshambo, Co. Leitrim).**

IRISH MINERALS AND RAW MATERIALS.

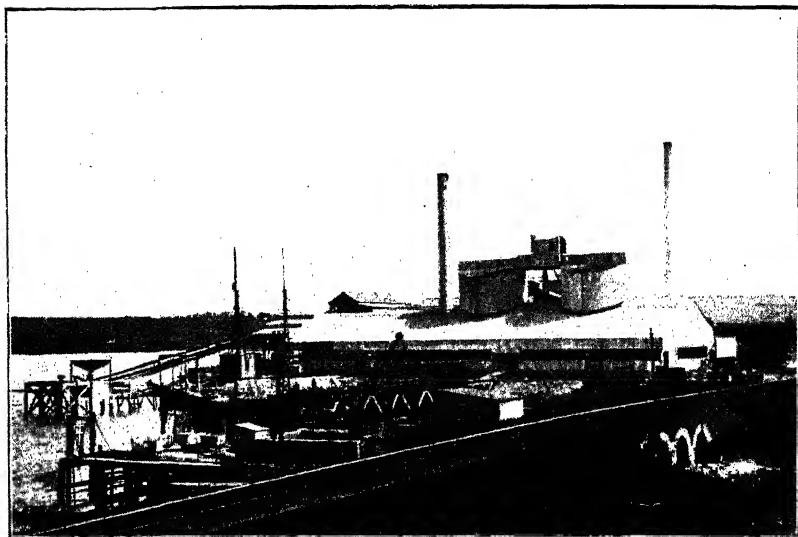
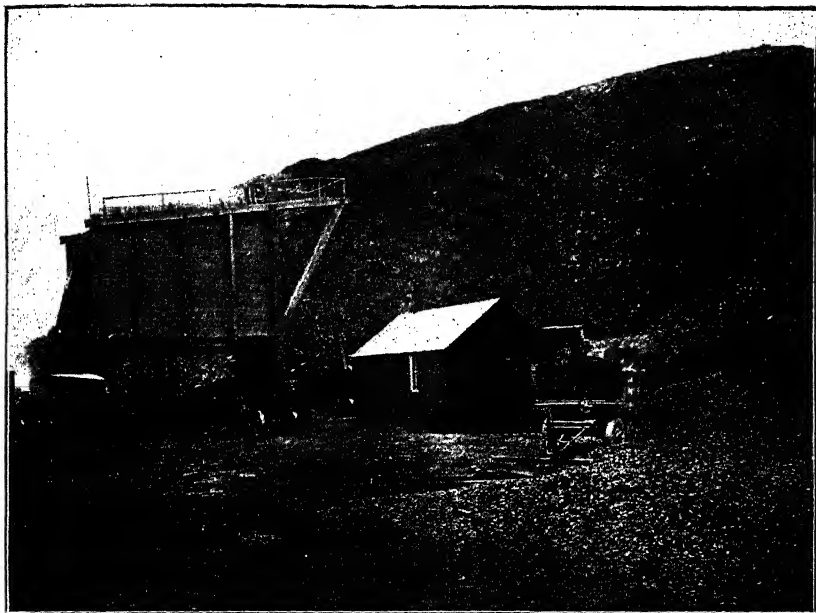


Fig. 11.—Cement Works at Magheramorne, Co. Antrim (British Portland Cement Manufacturers, Ltd.)



Fig. 12.—Carbide Works, Askeaton, Co. Limerick (Messrs. Hewson & Co.)

## IRISH MINERALS AND RAW MATERIALS.



*Photo by]*

*[Alex. Lee, Portrush.*

**Fig. 13.—Currycock Quarry (Giant's Causeway Columnar Basalt Co., Portrush).**

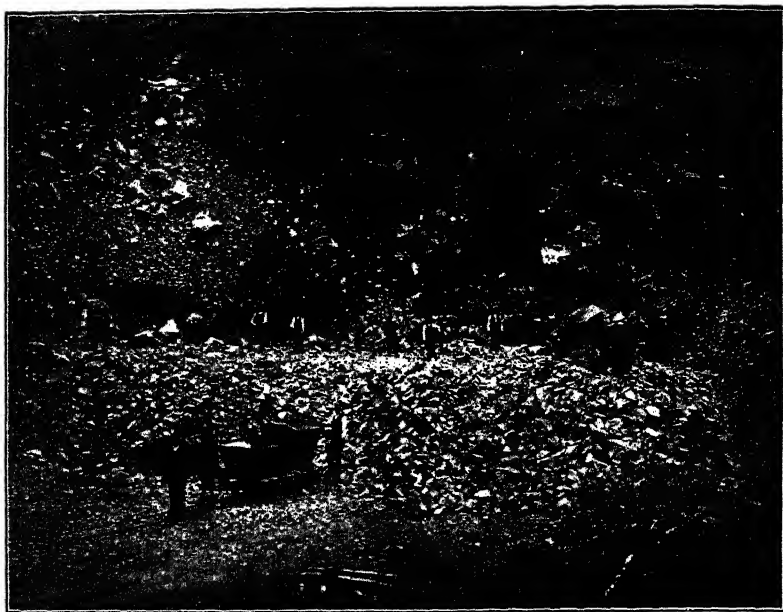


*Photo by]*

*[Mason, Dublin.*

**Fig. 14.—The De Selby Quarries, Mount Sheskin, Co. Dublin.**

IRISH MINERALS AND RAW MATERIALS.



*Photo by]*

*[Power, Arklow.*

Fig. 15.—The Parnell Quarries, Arklow, Co. Wicklow.

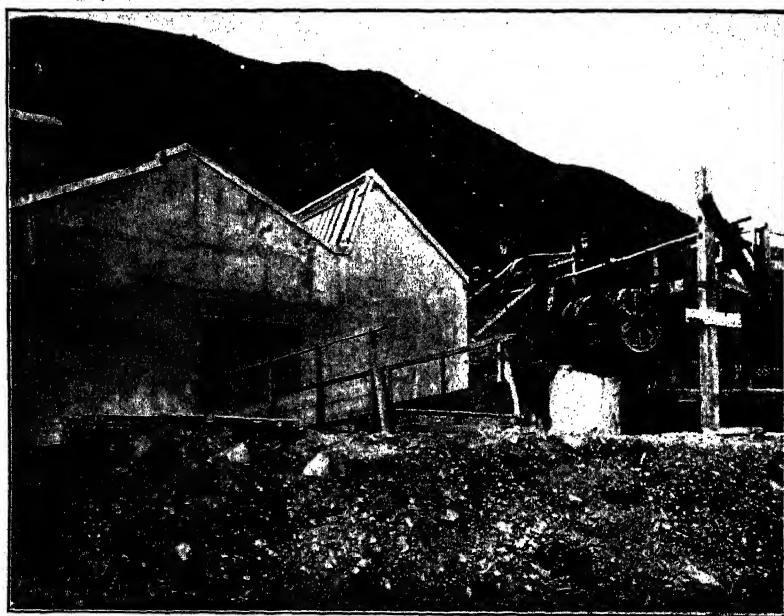


Fig. 16.—The Castle Hill Quarry (Castle Hill Quarry Co., Ltd.),  
Carlingford, Co. Louth.

The matter of the development of Irish bogs is being carefully considered, and there are at present in this city men of high intelligence, business capacity and wealth, who are only waiting to develop the Irish peat problem when they are satisfied that the "winning" end has been solved. If cheap power can be obtained, there is no reason why electro-chemical industries, such as the manufacture of Calcium Nitrate, etc., should not be established.

There are also Iron Ore Mines in Antrim, Bauxite Mines, and other mineral industries, which have been in existence in Ireland for many years, but I have thought it better to deal only with recent developments.

**Other Mineral Industries.**

## II.

It is proposed to deal in this second part of the paper, with deposits of minerals in Ireland which are worthy of being examined with a view to development when conditions are again normal.

I believe that the Coalisland coalfield, with its fire-clay deposits, merits consideration on the part of the capitalist. The coals are bituminous in character. I shall not deal here with the various thickness of the seams, which run from two to nine feet. There may be difficulties in working the 9 ft.

**Coalisland Coalfield and Fire-clay Deposits.**

or Annagher seam, owing to the fact that it rests upon fireclay floor, which swells with moisture and causes trouble in the level. What is required at Coalisland is a boring Syndicate to "prove" the ground, and, when this is proven, a large amount of capital for proper exploitation. There are some important geological points which must be considered in connection with the exploitation of this coalfield. The field, as a whole, is a speculative proposition, but worthy of the attention of capitalists. Admitting all its drawbacks it must still be granted that it contains many million tons of workable coal.

Large deposits of fire-clay occur in this coalfield, and I think there is a good opening here for an extensive trade in fire-clay goods. Glass sands occur to the east of Coalisland on the shores of Lough Neagh. To sum up, the whole district, to my mind, presents large possibilities. Then again, some of the ground from Dunganannon to Coalisland should also be prospected for coal.

The Slieveardagh coalfield lies about ten miles south-east of Thurles, and covers an area of about ten miles.

**Slieveardagh Coalfield.**

The coal is Anthracite. In a special report on this coalfield made a few years ago, I estimated that there are 15½ million tons of workable coal and culm. I am of opinion that this field deserves fuller



development, and it would be advisable to work it as a whole. The drainage of the field would also be best undertaken by one authority. It may not be out of place to lay stress on the fact that this coal-field will not bear high royalties and rents, and that, in view of the large expenditure which will be necessary for proper exploitation, the dead rents and royalties should be low, so as to encourage the prospector.

The Slieve-an-Ierin Coalfield, east of Lough Allen, is also deserving of attention.

Deposits of Lignite are found at different places around Lough Neagh. In Germany Briquettes for fuel purposes are made from this material, which may also be suitable for other uses. The beds are reported to be of considerable thickness, and attention might therefore be paid to the district.

Pyrites or Sulphur Ore is at present being worked at Avoca, Co. Wicklow. It was pointed out, as far back as 1904, that these sulphur deposits should be more fully developed, as they would probably be of value in case of war, when the shipments of Spanish ore would be interrupted. The Avoca deposits declined in output when the Huelva deposits of Spain started development. This district might very well be further prospected, which should be done by means of an adit level. Deposits of Pyrites also occur near the village of Silvermines, Co. Tipperary, in Connemara, and other districts throughout the country. These deposits merit consideration. The question of Sulphuric Acid is of prime importance at the present moment. Let us suppose that our Pyrites deposits are not available or are unsuitable. Still it must be remembered that almost all the Pyrites come from abroad—the United Kingdom procures practically all its Pyrites from Huelva. Ireland is geographically nearly as well placed as England and Scotland for the transport of Spanish Pyrites, which is brought to ports in these countries. Further, coal is not such an important item in the burning of Pyrites. Bog iron ore is used in many gas works in Ireland for purifying gas from sulphur. This is called spent ore, and the sulphur obtained therefrom might be found suitable for sulphuric acid manufacture. An opportunity thus presents itself for the consideration of the erection of another explosive factory in this country. Of course, other raw materials would be necessary. To my mind the best location for such a factory might be along the coast from Malahide to Drogheda. You have sand dunes, rail and water transport in this district.

IRISH MINERALS AND RAW MATERIALS.



Fig. 17.—Ballece Wood Quarries, Rathdrum, Co. Wicklow.

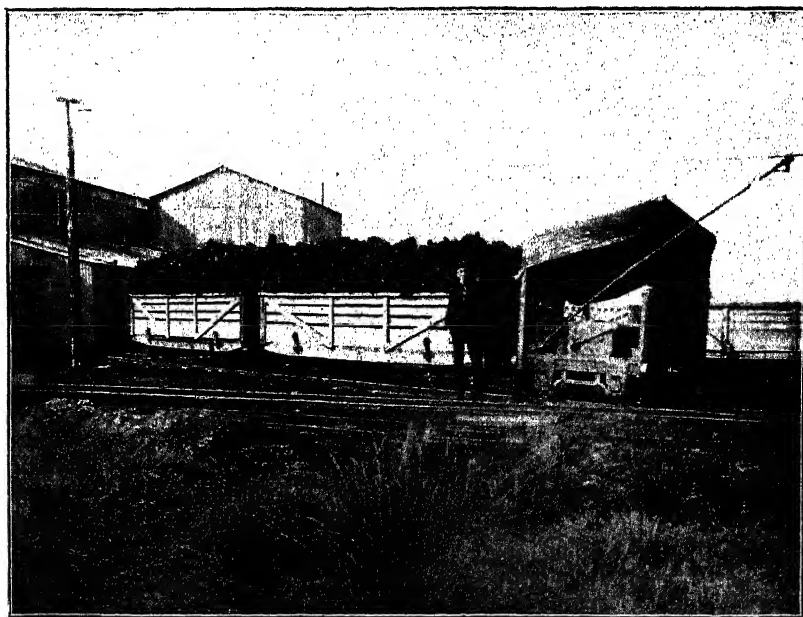
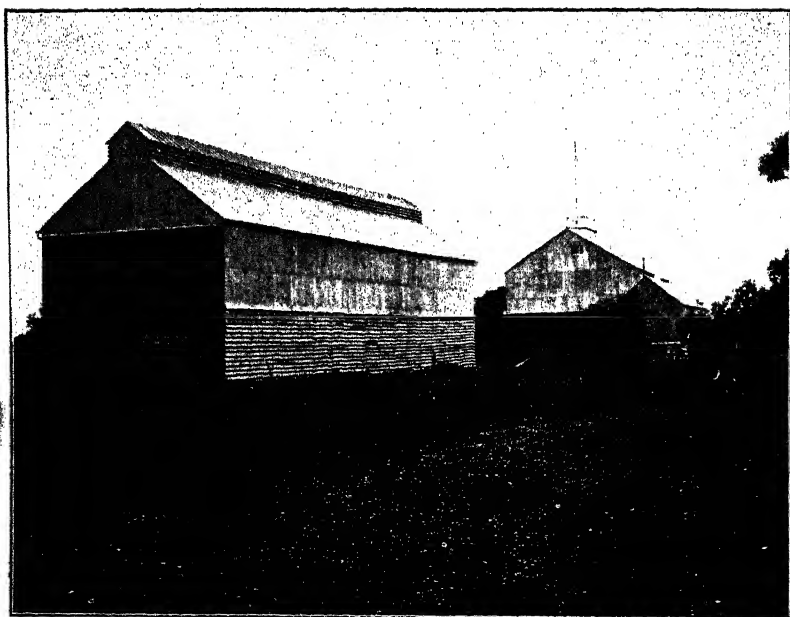


Fig. 18.—Peat Works (The Irish Peat Development Co.) at Maghery (near Portadown), Lough Neagh.

IRISH MINERALS AND RAW MATERIALS.



Fig. 19.—Maghery Peat Works. Men “breasting” turf.



*Photo by]*

*[Greene, Tullamore.*

Fig. 20.—The Turraun Peat Works (Turraun Peat Co.), Ferbane,  
King's Co.

IRISH MINERALS AND RAW MATERIALS.

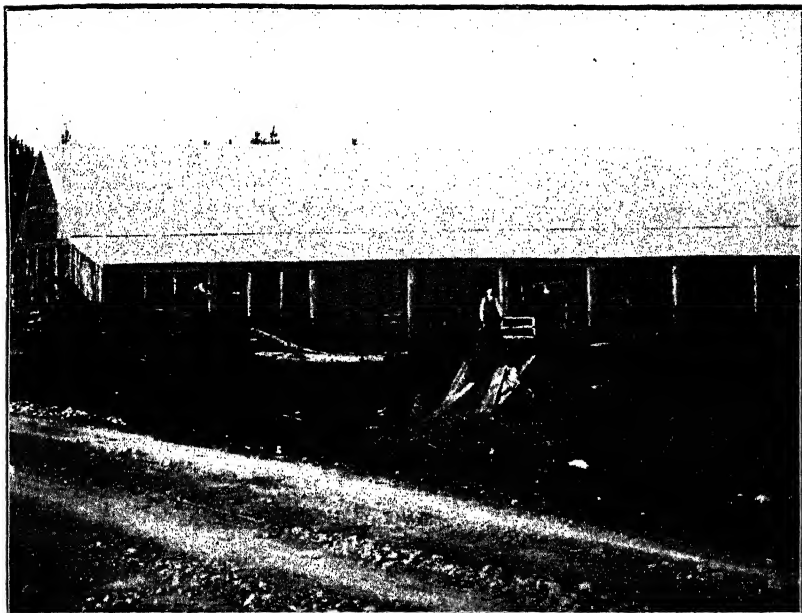


Fig. 21.—The Mulgeeth Peat Works, Johnstown Bridge, Enfield, Co. Kildare. (Proprietor : F. A. Evans, Esq.)

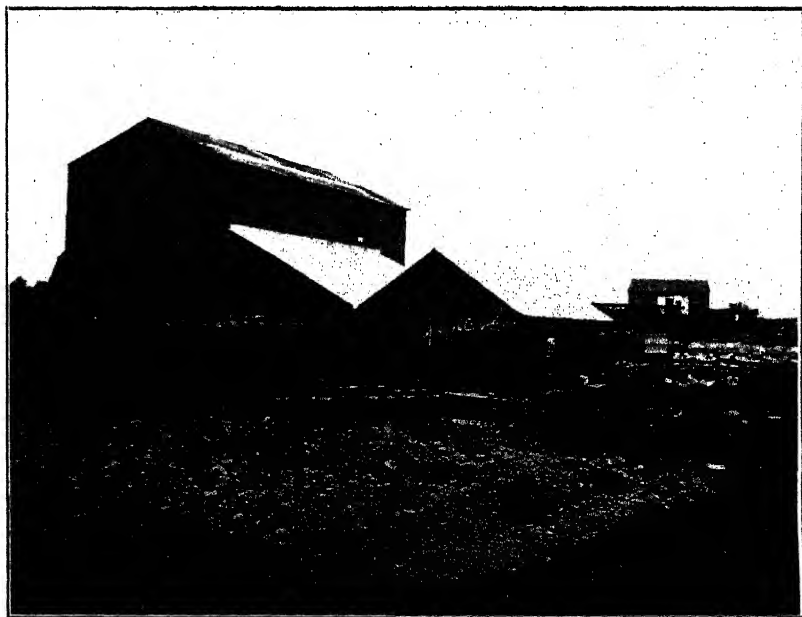
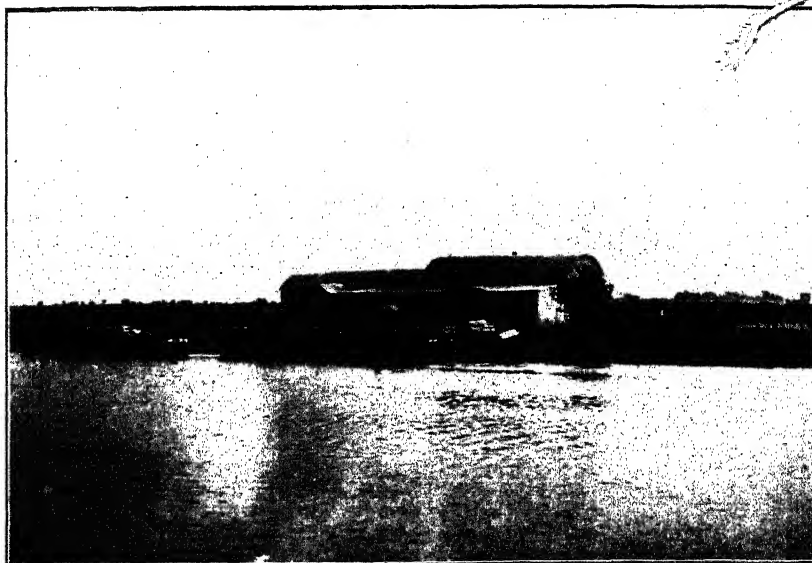


Fig. 22.—Peat Works at Edenderry, King's Co. (Irish Peat Industry, Ltd.)

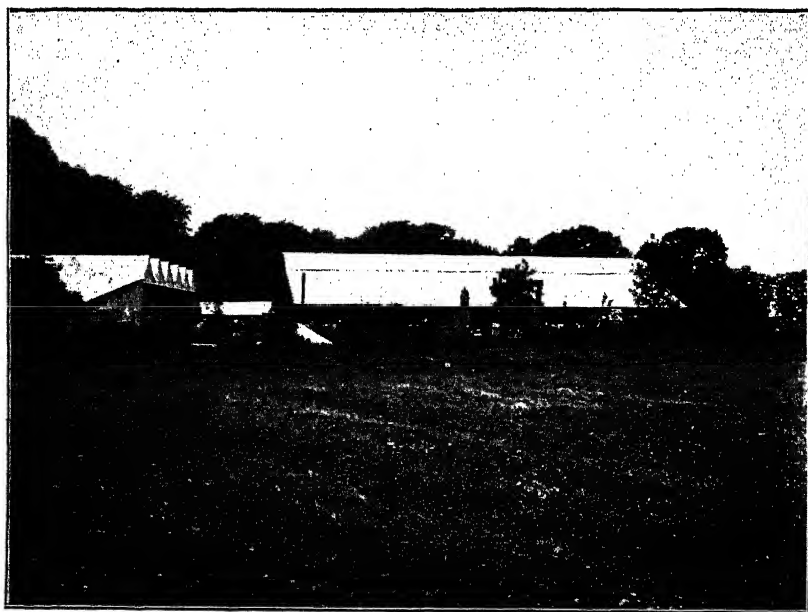
## IRISH MINERALS AND RAW MATERIALS.



*Photo by]*

*[Dallas, Garraugh*

**Fig. 23.—Works of the United Kingdom Peat Moss Litter Co., Ltd.,  
Portglenone, Co. Antrim.**



*Photo by]*

*[Greene, Tullamore*

**Fig. 24.—Rahan Peat Works, near Tullamore. (Proprietor :  
David Sherlock, Esq.)**

Deposits of Gypsum of good thickness are known to occur in the vicinity of Carrickmacross and Kingscourt.

**Gypsum Deposits.** Gypsum is the raw material for the manufacture of Plaster of Paris, and the deposits referred to might be profitable to work.

Veins of Pegmatite containing Felspar occur near Dooey Head, Donegal, and in other places in Ireland. These

**Felspar.** might be prospected, with the object of ascertaining if the Felspar would be suitable for Pottery purposes. In the event of a process being discovered to render the Potash in Felspar soluble, these deposits might be of value for fertilizing purposes.

At the outbreak of the war the Department began an investigation in order to ascertain whether sands suitable for use in the manufacture of clear and white glass, other than those at Muckish Mountain, Co. Donegal, occurred in this country. In the course of this investigation about 250 samples were collected, and, as one of the results, a sand found in the vicinity of Coalisland, together with a sand from Donegal, have been found suitable for use in the White Glass Bottle Works at Belfast. Sands suitable for the manufacture of black glass are at present being utilised in the vicinity of Dublin. The Irish White Glass Bottle Factories have hitherto used imported sand from Belgium, but owing to the war these supplies have been cut off.

There is another question regarding the manufacture of glass in Ireland, that is the manufacture of Sheet Glass. Small experiments carried out in the laboratories of the Royal College of Science have indicated that there are deposits of sand in various parts of this country which might well be further investigated by private enterprise to test their suitability for the manufacture of sheet glass.

The question arises as to where such a factory should be erected. This question requires much consideration, and could only be definitely answered by the results of such further inquiries.

It is well known that at Muckish Mountain, Co. Donegal (see Fig. 27), a large deposit of white sand suitable for the manufacture of glass (see Fig. 28) occurs. This is, no doubt, the best deposit of sand in Ireland, and I am informed that efforts are about to be made to develop these deposits.

Attention might be devoted to an increased production of paints and colours in Ireland. We have some of the raw **Materials for Paint** materials—umber, barytes, ochre, terra alba **Manufacture.** (mineral white, gypsum), whiting, etc. Germany exported over 3 million pounds worth of paints and colours in 1912.

The question of the manufacture of bleaching powder might be considered in the district around Larne Lough. **Bleaching** There are salt deposits close at hand, and the **Powder.** local limestone might be suitable. If not, there would be no difficulty in procuring a suitable limestone in Ireland. It will hardly be necessary to point out that a splendid market is at hand, as Belfast uses a large amount of bleaching powder.

### III.

A circumstance in Irish conditions which tends to facilitate the development of Minerals is the fact that under the Land Purchase Acts of 1903 and subsequent years, the mineral rights of land sold are, as a rule, vested in the Irish Land Commission. The policy of the Land Commission in this matter is to give fair and equitable terms to the prospector. Their dead rents and royalties for a two-years' prospecting lease, which lease carries the option for a lease proper, are low, so as to encourage the prospector.

What is required in this country are prospecting and developing companies, built up by men of capital, steered by practical mining engineers, stoked by applied chemists, and manned with intelligent labour. In Ireland there are many promising mineral deposits, and mineral resources must be largely developed in the future. Minerals do not grow! They are capable of exhaustion. Take them out of "Saskatchewan," in time they must be taken from somewhere else, and let us hope the somewhere will be "Ireland."

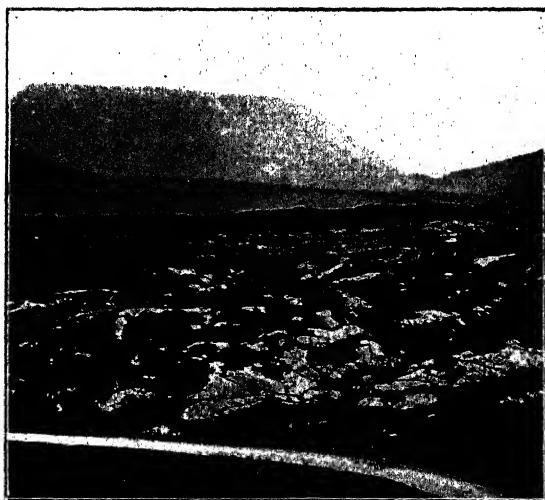
IRISH MINERALS AND RAW MATERIALS.



*Photo by]*

*[Wynne, Portarlinton.*

**Fig. 25.—Peat Works (The Umeras Peat Co., Ltd.), Monasterevan  
Co. Kildare.**



*Photo by]*

*[Lawrence, Dublin.*

**Fig. 26.—Muckish Mountain, Co. Donegal.**



IRISH MINERALS AND RAW MATERIALS.

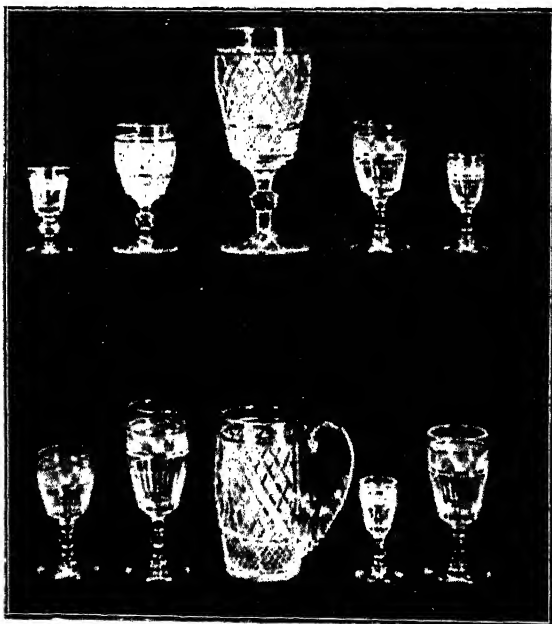


Fig. 27.—Reproductions of Waterford Glass made with sand from Muckish Mountain.

## CROP REPORT—MID-JULY, 1916.

The first half of June was marked by cold easterly and north-easterly winds, and, with comparatively little rain falling, crops were checked in growth. Brairds, both of corn and flax, suffered considerably, and many fields became yellow and sickly in appearance. A break in the weather set in at the 20th of the month, and the continuous rains of the two closing weeks brought great relief to everything. Owing to the backwardness of the season, hay-making, which usually starts at mid-June, did not become general until the beginning of July.

Fields of winter wheat are very promising, and in some cases are now coming into ear; the prospects of a satisfactory yield are good. Spring-sown fields are thin in comparison, and were not favoured by the nature of the weather since coming over ground. Oats, as a rule, are looking healthy, if backward, and the crop at present is of average promise; the prolonged wet and cold of late June affected fields on heavy, low-lying soils, and the crop in such situations requires heat badly. Barley is stated to be more uniform than either oats or wheat, and growers are satisfied with the present appearance of the crop. Rye, where grown on upland soil, is excellent and well into ear; on moory soils, except where the drainage is good, the plots are poor as a result of so much wet.

The small area under field Beans is healthy-looking, and the yield is expected to be satisfactory.

The potato crop is fully three weeks to a month late; even the early varieties were not ripe for digging until a fortnight beyond the usual time. Many main-crop fields are not much over ground and not nearly ready for hoeing. The crop has improved markedly for the past ten days but is still backward. Little spraying has been done as yet.

It was a most dragging season for getting mangels and turnips sown; some fields of the latter were only finished at 1st July. These crops came up healthy, and a considerable proportion has now been singled out. Owing to weather conditions there has been little trouble from fly attack on turnips. Both these crops, especially mangels, require heat.

The field cabbage crop suffered more than usual from slug attack which was encouraged by the wet. The present appearance is good.

Flax is variable; good, healthy-looking fields are the exception, and mostly due to the situation. Much of the

**Flax.** crop is short and backward, and a large area was unusually late in being sown. Growth of the crop, however, has much improved recently. The crop, as a whole, is expected to yield below average. The earlier sowings promise best.

Cutting of first-crop hay has been greatly delayed owing to the broken weather since mid-June, and backward

**Hay.** state of turnip-sowing. Yields are excellent, though some fields suffered from not being earlier cut, and there are complaints of the stalks being affected at the base from excessive dampness. Only a small area has yet been cut. The quality of the crop will depend on the character of the next few weeks. Fields of second-crop hay and old meadows are carrying full yields of grass, and the bulk will be well over average.

Pastures are excellently covered. Some owners are of opinion stock are not thriving so well as in other seasons,

**Pastures.** and attribute this to the inferior feeding quality of the herbage. It is admitted that the arrival of sunshine and heat would improve feeding conditions for stock on grass.

The extreme prices for fat and store cattle have dropped back for the past month, but rates are still high. Sheep

**Prices.** and lamb values shared in the fall to some extent. Grazing lands are well stocked; fairs are not so large of late, and there is an inclination to hold over rather than rush stock on the market—a feature which was very noticeable at early June. Dropped calves are exceptionally dear—£3 10s. to £4 15s. each—in some counties, five weeks old calves are bringing from £5 to £7 10s. per head. Pork prices are good, ranging from 84s. to 89s. per cwt. (dead weight). Young pigs (eight to ten weeks old) are fetching £3 to £3 5s. each in some northern markets. Dairy cows are milking out well, and butter prices are satisfactory—1s. 4d. per lb. in some counties. Good milking animals are in keen demand and fetching extremely high prices at fairs.

Detailed information as to the position and prospects of the crops in the various counties is set out below :—

#### *Leinster.*

Some fields of wheat are very good: others are thin and patchy.

The crop continues to make satisfactory growth,  
**Co. Carlow.** but would be much benefited by sunshine and warm weather. Oats has made slow growth on the lighter and poorer soils; late sown fields are very backward,

those sown early look very well. If weather is favourable the crop may be average. Barley is doing well and promises an over-average yield of grain and straw. Potatoes are backward in growth; fields of sprouted seed and those planted early give most promise. Some fields are patchy, owing to the failure of seed. The crop is not yet advanced enough to be sprayed. Turnips, as a rule, were late sown, but are healthy and growing rapidly; sowing was only completed at the beginning of July. Mangels are doing fairly well. Hay-making has begun; saving was greatly retarded by the broken weather; the yield is good and over last year's average. Old meadows are heavy; lodging has taken place in some cases. Pastures are well stocked with grass and carrying a full complement of cattle. All live stock are healthy and thriving well; prices have dropped considerably of late.

Wheat is growing satisfactorily; late sown fields are thin and patchy in some places. The oat crop is generally short, especially on heavy wet soils; preshaugh has grown very strongly in some districts. Barley looks fairly well, though somewhat short and backward. Early potatoes dug out a light crop, and were three weeks later than usual; the main crop has been mostly earthed up; in low-lying situations the crop is thin, owing to seed failure; spraying is not so generally practised as it should be. Turnips have been singled out in some cases; in other fields brairds are just over ground and doing well. Mangels, although sown late, have done well and show good promise. The weather has favoured field cabbage. First-crop hay is being saved at present; some fields have been put together in excellent condition; yields are heavy. Old meadows look promising. Pastures are luxuriant, and could carry even more stock.

Wheat has improved and looks well; the crop requires sunshine. Oats are promising, but owing to weather extra growth of straw harvesting will be late. Barley is good, except where seeding was done late, or in poor, low-lying fields. Rye is rather thin but otherwise promises well. Potatoes are very backward; little spraying has been done so far. Turnips have brairded very well and the fly has not been troublesome. Early sown fields have been singled out and are coming away well. Mangels are doing fairly well, but weather conditions have been against them—too much rain with a low temperature. First-crop hay will be a little more than average; conditions were too cold for fullest growth. Cutting has commenced, but saving is difficult and tedious. Pastures carry an extra

quantity of grass, but the quality is soft. Live stock are putting on flesh slowly, except where cake-fed.

Wheat, though well-cared, will be a week later in being cut than last year; it is a good crop in most districts.

**Co. Kilkenny.** Early-sown fields of oats are healthy; later sowings are rather short and thin. Barley looks very well. Early-planted potatoes are well forward; later fields are backward and not vigorous except where sprouted; broken weather has delayed spraying. Turnips are braiding well, and no damage has been caused by the fly; there is great variation in the forwardness of the crop. Mangels are backward but improving; the nights, till recently, were too cold for quick growth. Cabbages are medium. Fields of first-crop hay are heavy; cutting has been delayed owing to the weather; old meadows promise well. Though grass is plentiful, the feeding quality is not so good as other years. There are some complaints of cows going back in their milk supply owing to this cause; store cattle, besides, it is reported, are not improving as quickly as usual. Prices for all kinds of live stock are good. Sheep are making high rates—hoggets £3 to £3 6s. per head, and lambs from 35s. to 45s. according to quality.

Wheat in a few cases promises an excellent crop; the majority of spring-sown fields are patchy and thin. Oats

**King's Co.** on good soils will give a full average yield. Barley shows more promise than usual; some fields are, however, rather thin. Rye plots are good. Potatoes look healthy though late; spraying is about beginning. Brairds of turnips are healthy, a little re-sowing was required. Much of the crop is late. Mangels made a good start, and are growing vigorously; some fields are patchy. Cabbages are making good growth. Hay, both rye-grass and second crop, is a heavy yield. Pastures are very satisfactorily covered. Prices for store cattle are still high and finished animals command a good rate. Sheep values have dropped somewhat but are still satisfactory. Pork keeps up well in value; feeding stuffs are much dearer than in ordinary years.

Fields of winter and spring wheat are doing well on dry warm soils. In low-lying situations the crop is patchy.

**Co. Louth.** The oat crop also varies in the same way. Barley is but little sown; fields look well. Rye is growing very satisfactorily. Potatoes have improved much since mid-June, but are not so advanced as in other years; spraying has just begun. Mangels and turnips are doing very well of late and promise an average yield. Cutting of first-crop hay has just begun.

and yield will be heavy. Pastures are good nearly everywhere. Live stock are well up to average in numbers.

Wheat is doing well ; some fields, both winter and spring-sown, are rather thin. Oats did not make much pro-

**Co. Meath.** gress during June : the crop is backward for the time of the year. Barley looks promising but is also late. Potatoes are not as forward as in other years ; no spraying has yet been done. Sowing of turnips has just been finished ; a few fields have been singled out ; there has been little trouble from the fly. Mangels are growing well ; the crop is somewhat late, owing to the cold weather after seeding time. Cabbages are promising a good yield. First crop hay will be heavy in yield ; good weather is needed for saving. Old meadows are well covered. There is a good supply of grass. All stock is selling well ; only a small proportion of fattening cattle have been put on the market yet.

Wheat looks favourable : early sown fields are best. Oats, in most cases, promises well, though some fields

**Queen's Co.** are disappointing. Barley is doing well ; some fields are a little short. Potatoes are very backward in general ; some fields have just got their second moulding. All sowings of turnips are doing well ; there is little damage from the fly. Mangels are late, and just now being thinned out. Cabbages are good. First and second crops promise to yield well ; very little has yet been cut. Old meadows have to some extent suffered from too much rain. Pastures generally are good, except on low-lying ground. Cattle are in forward condition, though in some parts land is not so heavily stocked as in other years.

Wheat is variable ; the crop suffered from too much wet. The oat crop is fair, but was badly interfered with by  
**Co. Westmeath.** the weather in June. Barley is medium and fully a month late. Potatoes, where sprouted, look healthy. Turnips, as a rule, are growing strongly, as are mangels, although sown late. There is a prospect of a heavy hay crop, though very little has been cut yet. There is abundance of grass on pastures. Cattle and sheep are thriving well.

Wheat, both winter and spring-sown, is thin, and may not be up to average. Winter oats is only average, and

**Co. Wexford.** fully a fortnight late. Spring oats look best on dry, warm land ; the crop is short and backward on cold, heavy soils. Barley being sown on the dry and loosest land under cultivation has stood the weather best of all the cereal crops,

and is, generally speaking, looking very promising. Beans are healthy and may give a full yield. Potatoes are growing apace, but five weeks late; some fields show considerable misses owing to failure of seed; the crop is as yet too backward for spraying to be done. Turnips braided well; some fields are very dirty with weeds; there were many fields still to be sown at the beginning of July. Mangels have improved well of late. First-crop hay is not as heavy a yield as was expected; cutting has been much delayed. Old meadows are fair. Grass is plentiful though soft, owing to lack of heat. All kinds of stock are doing well. Cows are milking extremely well, and butter prices are good. Owing to the recent drop in cattle values, owners are not disposed to sell, more especially with plenty of grass available.

Winter-sown fields of wheat continue to look well, and are making steady growth; spring-sown fields are, as a rule, thin and patchy. The oat crop is somewhat backward and requires heat; charlock has infested fields badly in some districts. The small area of barley grown is promising. Potatoes are even and promising, though backward; no spraying has yet been done. Turnips are a strong uniform braird, and some fields are now singled out; weeds were difficult to keep down in the crop. Mangels are backward and some fields look very thin; singling out is in progress. Cabbage has come on fast of late. First and second fields of hay have made up well where cut; the weather delayed hay-cutting considerably, and some fields suffered in consequence. Old meadows are growing out well and promise satisfactory yields. Pastures are excellent. Live stock of all kinds are healthy; prices have dropped back considerably of late.

#### *Munster.*

The wheat crop is fair to average. Oats is thin and uneven; straw will be plentiful, though the grain yield may be light. There is a fair prospect for the small crop of barley grown. Rye on moory soils promises well. Potatoes show lighter foliage than usual for the time of the year. The crop is backward but healthy. Turnips have come on well, and suffered little from fly attack. Mangels are somewhat poor, but improving fast now. Cabbages are growing well. First-crop hay is cutting a good crop; the saving has been very tedious. Meadows are very good on warm soils. Pastures in many places were poor until recently; they are now looking well. Grass did not put condition on cattle so quickly as in other seasons. Cattle values have dropped considerably. All kinds of stock are selling

well, except young untrained horses, for which there is little demand.

Wheat has improved much, and some fields are now in ear; the prospects of a good yield are favourable; there  
**Co. Cork.** have been a few cases of smut attack. Oats benefited by the rains in the latter half of June; the straw is lengthening out, and the crop promises to be satisfactory. Barley, which is more widely grown this year for stock feeding, has the appearance of yielding well. Potatoes have made rapid growth recently; most fields are too backward for spraying to be started; the early crop lifted a good yield and realised high prices. Turnips are showing a good uniform braird and thinning is now proceeding. Mangels suffered a check from hard winds at the start, and later from fly attack; the crop is now going on satisfactorily and thinning is fairly common. Cabbages are fair to average. The flax crop in the south-western districts promises a good length of straw; fields are very variable in appearance. Saving of the early cut fields of first-crop hay was much interfered with by broken weather; the yield is heavy. Old meadows are likely to give a good bulk of hay. Pastures are carrying plenty of grass. Prices for cattle, sheep, pigs, and dairy produce are high. Owners are inclined to hold over cattle owing to the recent fall in value. There seems to be a good supply of fat cattle and lambs available.

Winter wheat is good and well-eared; spring-sown fields are backward and weedy and will be late in ripening.  
**Co. Kerry.** Oats promises to be a fair crop; the straw is short on stiff land. The barley promises best on strong soils. Rye on light dry bog and black surface land is doing well. Potatoes are not nearly so forward as usual, but, on the whole, the crop promises well; fields planted early in March on dry soils look best. Turnips are healthy; late sowings are doing well; most early-sown fields have been singled out. Mangels are picking up well; many fields are patchy, and the crop on the whole is very late. Cabbages have come on fast for the last two weeks. There has been a good yield of first-crop hay; the early cut fields were saved under difficulties. Old meadows will be heavy. Pasture has improved a good deal lately. Live stock are in good condition; there are reduced numbers in fairs, due to the drop in prices recently. Prices of all kinds of stock are much above normal, and likely to keep so.

Winter-sown wheat is coming into ear and promises well. Spring-sown fields are not so forward; the crop in general  
**Co. Limerick.** is thin. There will be a good yield of oat straw, but the crop is thin; preshaugh is very rampant.



in some districts. Barley is thin, except where heavily seeded; the crop is now doing well. Potatoes, though late, are promising; misses are common in many fields this season. Turnips are doing well and being thinned in places. Mangels are rather backward but growing strongly now; owing to the wet weeds were very troublesome. First-crop hay was heavier than usual; some fields suffered in quality owing to being over-ripe before the weather allowed it to be cut. Old meadows are excellent and fetching high prices on foot. Pasture is improved on all classes of soil and there is plenty of grass. There is a fall in the prices of store and beef cattle, although young calves keep very dear. Cows are milking very well.

Winter-sown wheat is eared out, and looks well and healthy; spring-sown fields are only fair, and poor in some districts. The oat crop looks fair generally, though straw may be short. Barley has a promising appearance and is in ear; a keen demand is expected for the grain this season. Potatoes are a satisfactory crop on the whole; spraying is about to begin, even though cost of materials is much advanced. Turnips are weak from too much rain and cold; early sowings are now nearly all thinned out; late brairds are healthy and free from fly attack. Fields of mangels are generally poor, with some exceptions. Cabbage promises a fair yield. First-crop hay will yield well; some fields are now saved. Old meadows are carrying a good bulk. Pastures look well and grass is plentiful. Milch cows are keeping up their milk supply well. Prices of cattle are not so high as last month. Fairs are small, as farmers are not inclined to sell at present prices. Pigs, both young and fat, are commanding high prices.

Wheat looks healthy and promising; rust has appeared in some fields. Oats are good in growth and colour; some fields, sown early on damp cold land, are poor. Barley is promising. Potatoes are healthy and the crop looks well, considering the lateness of planting; some fields show a considerable amount of misses owing to the failure of seed. Thinning of turnips is in progress; the crop is doing exceedingly well, and there is no attack from fly. Mangels are nearly all thinned and spreading well in the drills. Cabbages are good. First and second-crop hay is nearly all to cut yet: quality will be affected by over-ripeness through delay in cutting; yields are good. Old meadows promise well, and are selling at from £8 to £9 per Irish acre on foot. Grass is abundant and all stock doing well. Prices have dropped considerably since the third week in June; this is especially marked in aged beef cattle. Young stores for home

grazing are selling well and beginning to weigh better. Sheep have been very dear during the spring and early summer; prices have eased off of late; lambs, which were very scarce and dear, have also dropped in value. Springing cows and heifers as well as pigs, both fat and store, continue to sell well; there is a plentiful supply of young pigs.

### *Ulster.*

Wheat is growing well and, though little sown, promises a good crop. Oats is very variable, and there are a lot of

**Co. Antrim.** poor fields. Potatoes were planted so late the crop cannot be up to an average; a large proportion of the seed failed in some cases. Some of the crop was not overground at the beginning of July. Turnip sowing was late, but brairds are healthy and were suited by the weather. Very few mangel fields are to be seen. Cabbages vary according to the situation. Flax is very irregular; growth recently has been rapid and, if the weather suits, the crop may yet make up for the lateness in sowing. There are some excellent crops of rye-grass hay; hay-making began under very unfavourable conditions of weather. Pastures generally are good. The cold wet spring does not seem to have affected stock, which are thriving very well. Dairy cows are milking well. Prices of cattle have dropped greatly and demand is not so strong.

Winter-sown wheat is less grown than usual; spring-sown fields look well. The oat crop is late: some fields are

**Co. Armagh.** poor, especially after manure; yield will possibly be under average. Potatoes are under average, but looking well; late planted fields have the best promise; the crop has not been so backward in growth at the beginning of July for many years. Turnips were late sown generally; early-sown fields are being thinned; young brairds are healthy. Mangels were put in badly and are backward. Flax looked badly until recently; fields as a rule are short. Rye-grass hay is a good yield and some fields have been saved: cutting of the crop for seed-saving has not yet begun; the prospects of a satisfactory yield of seed are good if weather for harvesting be favourable. Old meadows appear good. Pasture is excellent. Prices for beef cattle and stores have dropped considerably.

Autumn-sown wheat is now looking remarkably well; spring-sown fields are still backward and not so promising.

**Co. Cavan.** The oat crop has improved, but fields as a rule are thin, especially when late sown, and the yield cannot be up to average. Some plots of rye on moory soil

promise well. The potato crop where planted early looks well ; late-planted fields are but poor, though they have improved much recently ; the crop has better promise on dry moory soils. Turnips struck growth very rapidly, and are healthy ; weeds were hard to combat this year, but the fly gave no trouble. Mangels are only grown in small patches and look well. Cabbage is backward and not as good as last year. Flax is now improving after the recent rains, but inclined to be short owing to the lateness of sowing. First-crop hay is a full yield ; saving of the early cut fields was difficult. Old meadows will be very heavy. Pasture is looking well ; heat would be beneficial to give quality to the grass. All classes of stock are selling well, especially young stock. Young pigs are fetching very high prices. The season was very unfavourable for hatching and rearing poultry. The wages of all kinds of labourers have advanced.

Wheat is very short for the season ; many fields are thin though healthy. Oats, where sown in time, looks fairly well : late-sown fields are very short ; the crop is poor in general. The bean crop, which is not much grown, is short, though healthy looking. Potatoes are very backward for the time of the year : many fields are not yet moulded ; the tops are very small, and spraying will not be possible for some time. Only an occasional field of turnips has as yet been thinned ; brairds of the later sowings look healthy. Mangels are very sparingly sown ; the crop, though late, is growing well. Cabbage is a fair crop on dry land. Flax is variable but has come on well of late ; fields on good deep land look best ; the crop as a whole is poor and patchy, except occasional fields which look fair. First-crop hay is a good average crop and rather heavier than last year. Cutting is about beginning, and good weather for saving the crop is badly needed. Pasture looks very good in many places. Cattle are not selling so well as in June. Fairs are small, though stock are in good condition.

Wheat is just coming into ear ; the crop is about ten days later than usual, but looks promising. Oats generally is an extremely poor crop ; straw is short and thin, and at present there is a prospect of light yield. Barley also is poor, but not so bad as oats. Field beans are only a moderate crop and not much grown. Potatoes have the worst appearance for years ; fields are backward and tops are small. Turnips are late but brairding strongly ; a few fields have been singled out and are growing well. Mangels though backward are healthy. Flax is variable ; most fields are short, but growing well now. First-crop hay is an all round good crop ; clover is plentiful

and cutting has just begun. Pastures are good, and it has been a record year for grass since the beginning of May. Live stock are lower in price, and recently the demand for store cattle has fallen off.

Autumn-sown wheat is very good, except in a few wet fields where the crop is thin and patchy. Spring sowings **Co. Fermanagh.** are as a rule poor and thin. Oats will be very short crop owing to the wet season. Rich old lea is carrying a fair crop. Yields will be under average both in grain and straw. Rye, which is only grown in bog plots, is very good. Potatoes were planted late and are very backward; the success of the crop will depend much on the rest of the season. Turnips are braiding very well; fields were got in very late, and only a few fields have yet been thinned. The mangel crop is free from blanks. It was very hard to keep fields clean of weeds. The cabbage crop has made little progress up to the present. There is a poor prospect of a satisfactory yield of flax; fields are as a rule short, especially on wet land. There is a splendid yield of first crop hay. Old meadows are also heavy, and if good weather be obtained a large acreage will be saved. Pastures are grazing well. Prices for all kinds of stock are high, especially for young pigs; demand for cattle has slackened off somewhat of late.

The small acreage of wheat grown is average. Oats generally looks very badly; fields on dry warm soils have **Co. Londonderry.** the best appearance; the crop has improved much of late, but requires heat. Beans, which are grown to only a small extent, vary in appearance according to the nature of the soil. Early planted fields of potatoes on dry soils promise best; the crop was very late in being put down. Turnips are growing well and braids look fine. Mangels are looking fair but would improve with warm weather. There are not many blanks in cabbages and the crop looks well. Flax has improved well for the past fortnight; on cold inferior soils the crop is extremely short, owing to the continued cold and wet. Clover is plentiful in first crop hay, and there will be a splendid yield; saving has begun. Pasture is good, though the quality of the grass, unless on rich land, is considered by some to be deficient in feeding values. Prices of cattle have fallen of late, though they are still high.

Winter wheat has improved considerably, and will be a fair average crop on reasonably good soil. Spring **Co. Monaghan.** sowings are late and patchy. The oat crop, except on specially favoured fields, is very poor; there is a general absence of the healthy green colour it should show.

Barley looks healthy and the promise is good. The potato crop is very variable; the greater portion was planted very late, and is extremely backward. Turnips were sown a month late; brairds look healthy; there has been no fly attack; very few fields are advanced enough for thinning. Mangels, though late, are making good progress. Cabbages are hardly up to the average of past seasons, but are improving. Fields of flax are variable; the crop in general has made good progress since mid-June; the prospects of an average return are fairly good. First crop hay is good in general, and will give a much heavier yield than last year. Old meadows show much promise. There is plenty of grass on pastures which are carrying an average number of stock. All classes of cattle are in good condition; dairy cows are milking up to average. Prices for all kinds of cattle have dropped appreciably. Pork, too, has fallen back, but still making up to 84s. per cwt. (dead weight). Young pigs (8 to 10 weeks old) are in good demand and fetching 38s. to 42s. each. Suckling calves are fetching from £3 10s. to £4 15s. each.

Wheat is an inferior crop; winter sown fields are slightly better.

Oats look very poor and will be under average;

**Co. Tyrone.** the crop has improved to some extent recently.

Potatoes are late for the season of the year, but coming on rapidly; if favoured with suitable weather may yet turn out a satisfactory crop. Most turnip fields are just coming into the rough leaf; very little thinning has yet been done; brairds are healthy. Mangels are very little sown; the occasional fields seen are backward. Cabbages are growing very fast. Much of the flax crop is patchy and short; there are a few good fields from early sowings; the later sowings around the first week in May will probably be short. First year's hay is cutting a good crop and will be a heavier yield than last year. Old meadows look well. Pastures are fairly good and improved much recently. Live stock are thriving, but young stock not putting on condition so quickly as in other seasons; dairy cows are milking satisfactorily. Beef and store cattle are selling cheaper; springers and milchers are as dear as ever; good cows are fetching £30 to £40 each.

#### *Connaught.*

Wheat is not so good as last year; winter-sown fields are just coming into ear; spring sowings are promising.

**Co. Galway.** Oats, except where conditions were favourable, are backward; generally the straw will be short. Barley shows a very fair promise and is much better than oats. Rye is good on dry moory soils. The potato crop is late and growth

was slow up till the beginning of July ; spraying has begun in some districts. Turnips are doing well ; the early sowings are best and have been thinned. Mangels do not promise so well as last season ; fields are, however, healthy and would be helped by heat. Cabbages are fair ; weeds are prevalent in the crop. First-crop hay yielded over average, but saving was tedious. Old meadows will be very good. Grass is abundant, though somewhat lacking in quality. Live stock are healthy ; as a rule cattle are not so forward as in other seasons.

Wheat is promising, though winter sown fields are much in advance of the spring sowings. In general the

**Co. Leitrim.** oat crop is short and thin ; it promises much better now than at the opening of June. The plots of feeding barley sown (Spratt's) are looking well on dry situations ; on wet soils the prospects is poor. Rye is satisfactory. Potatoes are a fortnight late and want heat ; the crop is growing rapidly at present. Turnips are promising, and failures are fewer than last season. Mangels are average good in appearance. Cabbages, except on heavy wet land, are doing well. First-crop hay is giving a good yield ; saving is well advanced. There is plenty of grass for stock ; the latter are in good condition. Young pigs are fetching very high prices.

Autumn-sown wheat appeared patchy during the spring, but has thickened out well now and is growing vigorously ;

**Co. Mayo.** late sowings of spring wheat are backward. Oats in low-lying districts was badly scalded by excessive wet and is poor in appearance. Barley, which is usually sown on light, porous land, looks healthy ; the crop is much more forward than oats. Rye, where grown on upland, is excellent ; on wet, moory soil, it is practically a failure. Potatoes are some weeks late, and some fields have just got their last moulding up ; growth has been satisfactory lately. Turnips have braided beautifully, and in some districts thinning has already commenced ; there have been no complaints of damage by fly. There are also excellent braids of mangels and thinning is in full swing ; extra labour was necessary this year to keep down weeds. Cabbages look healthy and likely to bulk well. Flax in the Ballina district has come on wonderfully ; fields are of good colour and uniform in length. First-crop hay is mostly all cut down and partly saved ; it gave an excellent yield. Old meadows are much more forward than usual and promise good returns. Pastures are carrying a full complement of stock, and grass is plentiful. All live stock are selling well. Fat lambs have realised £3 10s. each in

some instances ; young pigs (10 weeks old) have gone as high as £6 per pair.

Wheat has improved greatly ; winter-sown fields are in ear and much in advance of the spring sowings. The oat **Co. Roscommon.** crop is variable and was very short at the end of June ; yields can hardly be up to average. Barley is very little sown, but has done better than oats. The small area of rye grown looks well. Potatoes are backward and much in need of bright dry weather. Turnips came on strongly from the start, and are very promising. Mangels began growth slowly but are doing well of late. Cabbages are now growing fast ; there was a great proportion of bolted-plants. First-crop hay is generally very good ; cutting has begun, though saving was difficult at the outset. Old meadows promise to yield well. Grass requires heat to improve its feeding qualities. The season was late and unfavourable for turf cutting. Stock of all descriptions continue to realize high prices.

The area of wheat sown is small ; the crop is doing well. There is an extension in the area of oats sown ; the **Co. Sligo.** crop promise is satisfactory. Rye looks well. Potatoes are a backward crop, owing to being checked in growth ; there has been a great improvement in fields recently. Turnips and mangels are doing well and looking strong and healthy. There is no fault to find with the appearance of the cabbage crop. Hay yields are heavy, though little has been cut as yet. Pastures are good, and all kinds of stock fetching high prices.

*\* \* Since the above detailed report was prepared, a welcome change in the weather which set in after 15th July has greatly improved the outlook. With the favourable conditions of a bright dry atmosphere and strong sunshine, both first and second hay crops and a large proportion of the old meadows have been cut and saved in excellent order. The hay damaged by exposure to rain is confined mainly to those fields which were cut and made up during the broken period of early July. In the Southern counties all the cereals have come strongly into ear and fields of winter oats in Co. Wexford are colouring rapidly. Harvesting in this county is expected to begin at the second week of August. Potatoes are sharing in the benefits of heat and sunshine and the fields look vigorous and healthy. Mangels and turnips are growing fast since the change in weather, and though the former crop is very patchy, both root crops are now doing well and in some cases are almost meeting in the drills. On the whole the crop conditions at the end of this month (July) are much improved.*

## FRUIT CROP REPORT—JULY, 1916.

The following statement regarding the condition and prospects of the Fruit Crop in July is based upon reports forwarded by the courtesy of correspondents who are fruit growers in the several counties. These reports indicate that the harsh nature of the spring was very unfavourable to the fruit crop. The abnormal mildness of January encouraged the early blossoming of some fruit-trees such as pears, which were afterwards damaged by frost. There was an extraordinary show of blossoms on apple trees, but fruit did not set well owing to severe cold winds and, as some growers state, because of the absence of fertilizing insects. All the chief tree fruits—apples, pears, plums, damsons—are in consequence carrying much lighter crops than usual. Bush fruits, on the other hand, have cropped very satisfactorily, and yields of large clean fruit have been obtained or are anticipated. The strawberry crop was late in maturing, and difficulty was experienced in picking the crop in good condition. The rains at the end of June depreciated the flavour of the berries. The later portion of the crop benefited by the heat and sunshine which set in after July 15th, and is expected to be much superior in quality.

The details supplied from each county are as follows:—

### *Leinster.*

Gooseberries are an extra heavy crop. Strawberries are good.

Raspberries have fruited well, and there has been

**Co. Carlow.** a plentiful crop of all kinds of currants. The apple crop is light generally; some varieties are bearing well, especially Bramley's, which require thinning; other varieties such as Lord Grosvenor, Lane's Prince Albert, and Ecclelville Seedling are also carrying good crops. Pears on the whole are a light crop: some varieties are up to average. Plums are medium, especially on walls; Victorias are a good crop. Damsons are inferior in promise. Cherries are about average. The season was unfavourable for all kinds of bush and small fruits. Green fly attack was not so bad as usual; the caterpillars of the winter and Codlin moths, also gooseberry saw-fly, gave trouble in some gardens. The chief fungoid pests were apple scab, apple mildew, and American gooseberry mildew. Prices were fair, though all fruits were late in being ready for market. Strawberries brought 10*d.* per lb.; gooseberries 8*d.* per gallon.

Gooseberries were a good average clean crop of fruit. Strawberries, though three weeks later than usual,

**Co. Dublin.** returned a fine yield. Raspberries promise to be a heavy crop. All kinds of currant bushes bore well and were healthy and free from mite. Apples are hardly



average, though some varieties carry good crops. Pears are scarce. Except Victorias, plums are a light yield, as also are damsons. There is very little fruit on cherry trees. The caterpillars of Winter, Ermine, and Vapourer moth, as well as apple sucker, were the most troublesome insect pests. The chief fungoid trouble was caused by black spot on apples and pears, also canker. American gooseberry mildew was not much in evidence; silver leaf on plums is becoming more prevalent. Prices were better than for some years, though it is too early yet to express a definite opinion on the crops as a whole.

There is a full crop of gooseberries. Strawberries were late, owing to frost affection. Raspberries promise a heavy crop: the fruit is swelling well. Red and white currants are plentiful on bushes and the berries large. Black currants are good except where affected by mite. Late varieties of apples, such as Bramley's Seedling and Beauty of Kent, are cropping well: in grass orchards the yield is deficient. Pears are light in the open though fair on walls. Plums, especially Victoria, Czar, and Early Prolific are carrying full crops. Damsons are very variable: in some districts trees are carrying good yields. Cherries are fair to light in yields. Loganberries promise well. Aphis was less troublesome than usual; mildew and black spot doing harm to apples. There were occasional evidences of American gooseberry mildew. Prices for fruit were good, but the demand was slower than usual.

Gooseberries are below average. Strawberries were slow in ripening and hard to pick in good condition. Raspberries are a heavy crop. Red, white, and black currants are a satisfactory yield. Apples are under average in quantity, but quality is superior. Pears are a poor crop and much affected with scab. Plums are poor, owing to aphis attack: Victorias did best. Damsons are scarce. Loganberries did well, but crab apples and cherries are light crops. Of insect pests aphis on apple trees did most mischief. Green gooseberries sold locally at 1s. to 1s. 3d per gallon. Local demand for fruit was good.

Gooseberries and strawberries are a very good crop. Raspberries generally yielded well. Red, white, and black currants are excellent yields. Apples are variable, but the crop on the whole is deficient: early blossoming varieties did best. Pears and plums are much below average. Damsons are bad. Loganberries cropped well. Aphis and caterpillar attack was very prevalent, though insect trouble was not so bad as in other seasons.

Gooseberries are a good crop and the fruit large. Strawberries are plentiful, but did not colour well and some-  
**Co. Longford.** what lacking in flavour. Raspberries are good, though late. Red and white currants are average to good. Black currants are a heavy yield. Apples are a fair to average crop. Pears are fair on walls : slightly better in the open. Plums are fair : Victorias are best. Loganberries are a large crop where grown. Codlin moth and green-fly were the worst insect pests. Canker did some damage.

Gooseberries are but a fair crop. Strawberries are only a quarter crop. Raspberries are a full yield. Currants of  
**Co. Louth.** all kinds are plentiful. Apples are variable : some varieties cropping well. Pears are scarce, as are plums and damsons. The only fruit sold as yet are strawberries, which fetched 6d. per lb.

Gooseberries are very good and large and free from disease : yield is above average. Strawberries gave a good yield.  
**Co. Meath.** and also raspberries. All currant bushes cropped well. Apples are much below last season in yield, and the same is true of pears. Victoria and Orleans plums did well : other varieties are poor. Damsons are hardly average. Green-fly, Codlin moth and apple sucker were the most noticeable injurious insects. The chief fungoid trouble was caused by canker, black spot, mildew, and silver leaf disease. Current prices are : strawberries, 6d. to 8d. per lb. ; gooseberries, 6d. to 8d. per quart.

Gooseberries are a heavy crop, of good quality though late in ripening. Strawberries are plentiful, but owing  
**Queen's Co.** to the continued rains are late and poor in flavour : some of the fruit was lost. Raspberries are a very promising crop. There are full crops of red and white currants. Black currants are fair but uneven : bushes were checked by weather and aphid attack. Apples are only about half a crop : trees suffered from cold nights and sleet storms. Pears are medium in unsheltered districts. Plums are poor, though trees showed an abundance of blossom : the fruit is swelling slowly. Damsons are poor to average. Insect pests were aphid and American blight. Mildew affected apple trees badly. Strawberries are fetching 8d. per lb. locally, and green gooseberries 1s. 6d. to 2s. per gallon ; other fruits are not yet on sale.

Gooseberries are a heavy crop on old bushes : the quality is better on young bushes. Strawberries are about an  
**Co. Westmeath,** average crop, and are three weeks later in ripening than last season : ripening is unsatisfactory. Raspberries are over average. Red and white currants are good.

Black currants are only fair on old bushes. The apple crop is light, with the exception of Bramley's, Early Victoria, Lord Derby, and Bismarck, which have cropped fairly. Pears are very poor in the open : there is an average yield on walls and in sheltered situations. Plums are poor except on walls. Damsons are a light yield. Insect pests were not so troublesome : aphids did some harm to plum trees. The chief fungoid disease was apple scab. Prices for strawberries 6*d.* to 9*d.* per lb. ; gooseberries 4*d.* per quart.

Gooseberries are average. Strawberries are fair to good. Raspberries are a fairly average crop. Currants of all kinds range from medium to good. The apple crop is below average and so are pears. Plums and damsons are fair to poor. Of the insect pests, big bud in currant bushes and apple sucker did most harm. Fungoid attacks were canker and scab in apples. Marketing is local. Strawberries sold at 1*s.* 6*d.* per lb., but have now fallen to 8*d.*

Gooseberries are carrying very heavy crops. Strawberries are a fairly good crop of excellent fruit, but very late. Raspberries show a very good prospect of a heavy crop. All currant bushes are very heavily laden. Apples have a medium crop of good fruit. Pears are rather below average. Plums and damsons are both light crops. Cherries are carrying fairly. Loganberries look well. Insects though troublesome were not so bad as last year : the chief of these were green-fly, gooseberry saw-fly, and also woolly aphids. The only fungoid diseases were American gooseberry mildew and silver-leaf on plums.

#### *Munster.*

Gooseberries in general are good. Strawberries are average, but slow in ripening. Raspberries promise a heavy crop. All currants are from average to heavy. Apples are variable and will be under average : a few varieties are cropping well, notably Bramley's, Grenadier, and Lord Grosvenor. Pears are a light crop both on walls and in the open. Plums are hardly average though Victorias bear well. Damsons are little grown and are a light crop. Cherries, where grown, are under average. Insect pests did not give the same trouble as in previous years : the chief forms of fungoid attack were black spot, canker, and brown rot. Strawberries are fetching from 6*d.* to 1*s.* per lb. ; gooseberries 3*d.* per quart.

Gooseberries are plentiful and the berries are good-sized : it is the best crop for some years, and quality is excellent. Strawberries gave a fair yield : owing to the lateness of the season the fruit ripened slowly. Raspberries generally are a good crop, though the late frosts ruined

the first blossoms. Currants are a good crop, especially black currants which are heavy. Apples are in general from an average to a poor crop, and the majority of trees are carrying only a sprinkling of fruit. Pears are, without exception, extremely thin. Plums are poor, and many trees failed entirely: except on walls are much under average. Damsons are bad. Loganberries, which are becoming very popular, are a very good crop. Insect pests have been troublesome: aphis on apple, plum, gooseberry, and currant bushes; winter moth and Codlin moth also did much damage: apple sucker was also in evidence. The most troublesome fungi were apple canker and silver-leaf. Local prices for fruit are 6*d.* per lb. for gooseberries, and 1*s.* per lb. for strawberries.

Gooseberries are exceptionally good this year in all districts.

Strawberries are a plentiful crop, but in many places the fruit was slow to ripen. Raspberries promise well. Red and white currants are very good, but not much grown: black currants are a good plentiful crop of large fruit. The apple crop is poor, though in some districts the Early Victoria, Bramley, and Beauty of Bath are bearing nice crops of fruit. Pears are bad and not much grown in the open. Plums are poor though fairly good on walls. Loganberries and cherries cropped fairly. The worst insect pests were gooseberry saw-fly and the caterpillars of Codlin and winter moths. Canker was the most troublesome of the fungoid diseases. Gooseberries sold at from 2*d.* to 3*d.* per quart, and strawberries at from 6*d.* to 1*s.* per lb.

Gooseberries are an excellent crop. Strawberries did well. Raspberries are average to good. Red, white, and

**Co. Limerick.** black currants are satisfactory yields. Apples are variable, and pears are under average. Plums and damsons are both light. There has been little trouble from insect pests except gooseberry saw-fly and winter moth. Canker and mildew were the chief fungoid troubles. Strawberries are fetching from 10*d.* to 1*s.* 2*d.* per lb., and gooseberries are selling at 2*s.* per stone.

The crop of gooseberries is average generally, and above average in many places. Strawberries are average, but

**Co. Tipperary.** difficult to get into condition for picking owing to the wet. Raspberries are plentiful. Red, white, and black currants are carrying well. Apples are, as a rule, below average, except Bramley's: in many sheltered gardens there is an average crop on most varieties. Pears are below average. Plums are very scarce and most trees failed to carry: Victorias are average in some places. Damsons are below average. Insect pests were

not so bad as usual, and the cold weather of June kept them in check. The only noticeable fungoid diseases were silver-leaf on old plum trees and canker on apples. All the small fruits are marketed locally.

There is a very heavy crop of gooseberries. Strawberries are plentiful, but the wet weather makes it unfavourable for picking them. Raspberries are a heavy yield. Red and white currants are good, but not much grown: black currants are very good. Apples will be under average: the best croppers are Bramley's, Grenadier, Lane's Prince Albert, and Bismarck; Newton Wonder and Beauty of Bath are only fair. Pears are variable: the crop is average to poor. Plums are fair in places. Cherries are light. Loganberries are good. Green-fly and American blight were the worst insect pests. Canker has been very prevalent in orchards under grass. Strawberries are fetching 6d. to 8d. per lb. locally.

#### *Ulster.*

Gooseberries are a very good crop, except in a few districts. Strawberries are an average crop but much later than usual, and fruit did not swell owing to the low temperature. Raspberries promise well. Red and white currants are an average crop, but not much grown. Black currants promised well when in flower, but much damage was done by high and cold winds: the crop is under average. The apple crop promises to be very poor in the open. On very sheltered places and on walls an average crop is expected. Pears are fair against walls but almost a failure in the open. Plums are, generally speaking, a poor crop. Damsons, very few on the trees. Loganberries promise a heavy crop. Aphides and the caterpillar of the winter moth have been troublesome. Apple scab is the chief fungoid pest. Prices are good for small fruits, and the demand is greater than the supply.

Gooseberries are above average; fruit large. Strawberries are an average crop. Raspberries promise well. Red and white currants are fair to average. Black currants are a very good crop, but not much grown. Apples are a very bad crop. Pears only medium. Plums are an average crop. There is only a sprinkling of fruit on damson trees. Loganberries an average crop. Aphides and the caterpillars of the winter, Ermine, and Tortrix moths did serious damage. The most troublesome fungoid pests are canker, brown rot, and apple scab. Markets not open yet, but there is a good enquiry for small fruit.

Gooseberries are a very good crop. Strawberries are plentiful but late. Raspberries promise well. Red, white, and black currants are bearing well. Apples are good in some districts and poor in others, especially on old trees. Pears moderate. Plums are variable, according to locality. Damsons and cherries are poor crops. Caterpillars of the gooseberry saw-fly and the Codlin moth did some damage. Scab is bad in many orchards. Gooseberries are fetching 10s., and black currants 30s. per cwt., respectively.

Gooseberries are above an average crop. Strawberries very good. Raspberries fair to good. Red and white currants good. Black currants are variable, poor to good. Apples are fair. Bramley's and Newton Wonder bear an average crop; Early Victorias about one-third crop, and Lane's Prince Albert and Grenadier carry one-half crop. Pears are below average. Plums a medium crop, though Victorias, in some districts, carry an over average crop. Insect pests have not done much damage. Apple scab was prevalent in some orchards, especially on the early varieties.

Gooseberries are a heavy crop. Strawberries are above average, but much damaged by rain. Raspberries promise a very good crop. Red, white, and black currants are over average, but late in ripening. Apples are about one-third of an average crop. Pears almost a failure in most parts. Plums are variable, from good to poor. Damsons are good in some districts and a failure in others. Cherries are a fair crop. Insect pests have not been troublesome, with the exception of aphides. Apple scab is the worst of the fungoid diseases. Gooseberries are fetching from 16s. to 20s. per cwt.

Gooseberries are a very good crop and of good quality. Strawberries are under average. Raspberries promise an average crop. Red and white currants are cropping well. Black currants are under average, the fruit being small and late in ripening. Apples are a very poor crop generally. Pears are a very light crop, both against walls and in the open. Plums and damsons are bearing badly in most districts. Loganberries promise a full crop. Insect pests are less troublesome than usual, but apple scab is doing much damage. Markets are chiefly local for small fruits; green gooseberries are fetching 2½d. to 3d. per quart.

The gooseberry crop is above average. Strawberries are a poor to medium crop. Raspberries are promising Co. Londonderry. fairly well. Few red and white currants are grown, but the bushes are cropping well. Black currants are below average. Apples are a bad crop. Pears are grown sparingly, and the crop is in general below average. Plums and damsons are a poor crop. Caterpillars of the winter moth are numerous in some orchards. Clustercup on gooseberries and scab on apples are the worst fungoid pests. Little fruit marketed yet.

Gooseberries are a very fine crop. Strawberries good, but affected by the wet weather. Raspberries promise a fair Co. Monaghan. crop. Red, white, and black currants are in general a good average crop. Apples are under average, but in some places there is a full crop. Pears, not much grown, are an average crop. Plums are a heavy crop in parts. Damsons fair, but not so good as last year. Apple blossom weevil did some damage this season. Gooseberry mildew and canker are the most troublesome fungoid pests. Not much marketing of fruit done yet.

Gooseberries are over average in yield and the quality good, though the berries are small in some districts.

Co. Tyrone. Strawberries are a fair crop of good-sized fruit, but the colouring and flavour are not good. Raspberries give promise of an extra good crop. Red and white currants are average. Black currants are cropping well, and the berries are large. Apples are on the whole below average; Bramley's and Royal Jubilee show a fair crop. Pears are only a medium crop. Plums are average: the Victoria variety is cropping best. Damsons are a poor crop, and cherries are under average. Insect pests have not been very troublesome with the exception of American blight, black-fly, and pear midge. Silver-leaf and black spot are the chief fungoid pests. Not much fruit marketed yet. Gooseberries are fetching 11s. to 12s. per cwt., and black currants 32s. to 40s. per cwt. in Strabane.

#### *Connaught.*

Gooseberries are a good average crop. Strawberries are barely an average crop, and the fruits are ripening slowly.

Co. Galway. Raspberries promise well in most districts. Red, white, and black currants are a heavy crop. Apples are about average; Bramley's heavily laden in most gardens. Pears are in general a light crop. Plums are variable, poor to good. Damsons, not much grown, are fair. Insect and fungoid pests have not been troublesome, with the exception of aphid on currants and canker on apples.

Gooseberries are a full crop in some gardens and moderate in others. Strawberries are a fair crop, but late.

**Co. Leitrim.** Raspberries are plentiful, but the fruit is small.

Red, white, and black currants are under average and the berries smaller than usual. Unless on walls the apple crop is under average. Pears are variable, poor to fair. Plums are only medium. Damsons are not up to average, and cherries are scarce. Insect and fungoid pests not troublesome.

Gooseberries are a very good crop of large fruit. The strawberry crop is good, but late in ripening. Raspberries

**Co. Mayo.** promise well. Red, white, and black currants

are in general a good crop. Apples are an average to good crop, though in some gardens a failure is reported. Pears an indifferent crop. Plums and damsons are variable, good to bad. Loganberries are a good crop. Aphides, apple sucker, caterpillar of the gooseberry saw-fly and winter moth are prevalent. Canker and black spot are the worst fungoid pests.

Gooseberries are variable: very good in some districts and poor in others. Strawberries are very good in most

**Co. Roscommon.** orchards. Raspberries promise a fair crop. Red, white, and black currants are plentiful on the bushes. Apples are below average; Bramley's only bear a one-third crop. Pears are a fairly good crop and plums average. Loganberries are bearing well. Aphides have been troublesome on cherries and plums. Very little fruit yet sold; some early strawberries fetched 1s. 6d. per lb.

Gooseberries are very good in some districts, but on the whole are below average. Strawberries are a good all-

**Co. Sligo.** round crop, but late. Raspberries promise a heavy

crop. Red, white, and black currants are bearing well, and the berries are of good size and quality. The apple crop will be light as compared with last year. Pears are variable, average to poor. Plums and damsons are cropping badly. Loganberries are well over average. Apple sucker and the gooseberry saw-fly were the worst insect pests. Canker, mildew, and scab are fairly prevalent. Gooseberries are fetching 2d. to 4d. per lb.; strawberries 6d. to 2s. per lb.; black currants 3d. to 4d. per lb.



## REPORT ON THE PREVALENCE OF POTATO BLIGHT IN IRELAND UP TO 15th JULY, 1916.

The first appearance of Potato Blight was reported this year from Rockfield, Co. Galway, on the 6th of June. Last year the first outbreak was noticed at Valentia Island on the 29th of May. On Innisboffin Island blight appeared on the 14th June, 1916, and on the same date the blight was reported as appearing at Abbert, Ballyglunin, Co. Galway. On the 20th June an appearance of the disease was reported at Achill Sound, Co. Mayo.

For each of the weeks ended 1st July, 8th July, and 15th July, respectively, weekly reports were received as in former years from approximately, 1,300 rural Constabulary Sub-districts throughout the country. The following comparative table shows the total number of sub-districts from which blight outbreaks were reported in the corresponding three weeks of the seasons 1913, 1914, 1915, and 1916 :—

1913.	1914.	1915.	1916.
43 up to 28th June 196 up to 5th July 283 up to 12th July	9 up to 4th July 31 up to 11th July 117 up to 18th July	15 up to 3rd July 32 up to 10th July 93 up to 17th July	6 up to 1st July 80 up to 8th July 269 up to 15th July

On account of the backward condition of the crop and the low temperature few reports of blight attack were received up to the 1st of July. At mid-July, owing to the prevailing wetness of the season, the disease had made its appearance both in the garden and field crop to a fairly large extent in comparison with the years 1914 and 1915.

### ACTION OF THE DEPARTMENT.

#### I.—*General.*

The action which has been taken by the Department this season to secure the more general practice of spraying may be stated briefly as follows :—

Over 200,000 copies of the Department's leaflet No. 14, dealing with the prevention of potato blight and giving full directions with regard to the spraying of potatoes, have been printed and distributed through the National Schools and numerous other sources to farmers in every district in Ireland.

Placards reminding farmers of the necessity for early spraying, and advising them to buy the raw material and prepare their own mixtures, have been displayed in every district in Ireland, and have also been sent to National Schools and to Creameries.

The County Instructors in Agriculture and Horticulture, of whom over 80 are now employed, have given special attention to the encouragement of spraying.

## II.—*Congested Districts.*

Fifty-nine overseers and assistants, and eight temporary demonstrators in spraying are employed by the Department in congested districts, and, as forming part of their duties, these officers are required :—

- (a) To repair spraying machines which are out of order.
- (b) To sell spraying machines, where such cannot be obtained locally, to farmers within certain limits of valuation ; and,
- (c) Generally, to give demonstrations in spraying, as well as such instructions and advice as may be required by persons in their district.

The demand for spraying machines in congested areas has been considerable, and approximately 500 machines have been distributed this season.

## III.—*Potato Disease.*

The Department are continuing the investigations relating to potato disease which have been in progress for several years at the temporary station at Clifden, Co. Galway.

A report on last year's investigations appears on page 564 of this issue of the Department's JOURNAL. This report will be reprinted and a copy may be obtained free of charge on application.

Farmers are specially invited to co-operate by sending particulars of the occurrence of any of these diseases in their districts. Specimens of diseased plants for examination and report can be sent free by letter post when addressed to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin. Such specimens should consist of the whole plant, including tubers, and should preferably be sent packed in a box.

# FOURTH IRISH EGG-LAYING COMPETITION.

## THIRD QUARTERLY REPORT.

The following Tables show the position of the pens at the end of the third quarter.

TABLE A.—COMPETING PENS.

Order of Merit.	No. of Pen.	Breed.	No. of Eggs laid, 1st Oct. to 30th June	Value of Eggs laid.
1	34	White Wyandotte	1135	£ s. d. 7 6 9½
2	27	" "	1034	7 5 10½
3	25	" "	921	6 15 7½
4	5	White Leghorn	1035	6 15 3½
5	33	White Wyandotte	1038	6 14 7½
6	4	White Leghorn	1022	6 12 6½
7	18	Rhode Island Red	955	6 10 6
8	1	Black Minorca	948	6 10 5½
9	32	White Wyandotte	915	6 9 6
10	35	" "	982	6 8 7
11	26	" "	906	6 7 11
12	30	" "	927	6 4 0
13	29	" "	922	6 1 7
14	22	" "	898	6 0 8
15	7	White Leghorn	931	6 0 2
16	12	Rhode Island Red	843	5 15 9½
17	6	White Leghorn	890	5 14 10
18	9	Buff Orpington	799	5 11 5
19	3	Black Minorca	821	5 9 6½
20	28	White Wyandotte	780	5 6 2
21	24	" "	823	5 5 8
22	11	Faverolle	813	5 3 1
23	23	White Wyandotte	767	5 2 6
24	10	Red Sussex	754	5 0 9
	17	Rhode Island Red	708	5 0 9
26	31	White Wyandotte	783	4 19 6½
27	15	Rhode Island Red	772	4 18 8½
28	2	Black Minorca	758	4 17 4½
29	19	Rhode Island Red	752	4 14 8½
30	13	" " "	721	4 12 3½
31	14	" " "	609	3 19 11
32	21	" " "	611	3 19 7½
33	16	" " "	659	3 16 9½

TABLE B.—NON-COMPETING PENS.

1	45	Rhode Island Red	990	6 11 9½
2	43	" " "	875	6 2 3½
3	41	White Leghorn	948	5 17 0
4	44	Rhode Island Red	914	5 14 0½
5	36	Plymouth Rock	902	5 13 9
6	42	White Leghorn	854	5 9 5½
7	20	Rhode Island Red	801	5 9 5
8	8	White Leghorn	821	5 8 0
9	40	Rhode Island Red	836	5 5 2½
10	39	" " "	834	5 4 4½
11	46	" " "	847	5 4 2
12	38	Red Sussex	732	5 2 3½
13	37	" " "	728	5 2 1½
14	47	Rhode Island Red	734	4 16 5
15	49	" " "	644	4 3 7½
16	43	" " "	599	3 17 5

## OFFICIAL DOCUMENTS.

### I.—AGRICULTURE.

#### DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

##### NOXIOUS WEEDS.

The Department of Agriculture consider it opportune to remind farmers of the importance of taking up the work of dealing with harmful weeds at the very first available opportunity. Not only are such weeds unsightly and injurious, but, in view of the need for the maximum food production, it is essential that they should not be allowed to take the place of useful food or forage plants. Over the greater parts of Ireland certain weeds have now been systematically destroyed for a number of years, and it should be the aim of all occupiers of land to do their part in maintaining and extending the improvement already effected. The farmer who is careless in this respect would do well to recognise the injury which his negligence causes to his neighbours.

The occupier of land who fails to cut weeds is liable to a fine of £5; and, as a matter of fact, this penalty was imposed last year by a Petty Sessions court.

*20th June, 1916.*

#### DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

##### PURCHASE OF MACHINERY, MANURES, AND FEEDING STUFFS.

Owing to the scarcity of labour and the disturbance of railway and shipping traffic in Great Britain, delays in the delivery of agricultural requisites in this country are of frequent occurrence. Under present conditions there is little hope of any marked improvement in this matter.

Farmers and traders, therefore, are most strongly urged to place their orders for harvesting machinery and binder twine much earlier than usual, and to take steps to ensure that delivery is not postponed until the goods are required for use. If this is not done, inconvenience and loss may arise later in the season.

Attention is also directed to the fact that difficulty may be experienced in securing delivery of fertilisers and feeding stuffs next autumn and winter. Accordingly, farmers should place their orders for these goods during the summer; and merchants will be well advised in procuring delivery before autumn.

*July, 1916.*

## DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

### CATCH CROP SEEDS FOR AUTUMN SOWING.

#### IMPORTANT TO SEED MERCHANTS.

In view of the pressing need for increasing the productiveness of the land, the Department are devoting special attention to encouraging the sowing of autumn catch crops. The principal seeds required for such crops are:—

- (1) Rye.
- (2) Vetches.
- (3) Hardy Green Turnips (such varieties as Hardy Green Round, Greystone, etc.)
- (4) Rape.
- (5) Italian Ryegrass.

During the past two years complaints have been received by the Department that seeds of some of these crops, particularly rye and vetches, were not available for sowing sufficiently early to ensure satisfactory crops, and that the work of the County Instructors in Agriculture has been handicapped in consequence.

It is realised that difficulty is often experienced by merchants in securing delivery of new rye seed as early as is desirable. It is hoped, however, that in districts where a demand exists merchants will make special efforts during the ensuing season to obtain early delivery of rye seed from the 1916 crop, and also of new seed of the other crops mentioned above. It may be stated that home-grown rye seed sown in experimental plots last autumn gave equally as good a crop for cutting green this spring as imported seed.

Leaflet No. 80 contains information relating to catch crops.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND,

A. 11268—16

UPPER MERRION STREET, DUBLIN,

11th July, 1916.

SIR,

It has come to the notice of the Department that in some parts of the country unusually large numbers of stocks of bees are dying this year from starvation. I have, therefore, to suggest that the County Instructor in Bee-keeping should advise bee-keepers that stocks which are light in weight should be fed with Summer Syrup.

In this connection, the Department also consider it advisable to point out that in many cases stocks affected, even slightly, with Foul Brood have died, and that combs are lying in the hives. As these hives would, of course, form a source of infection to healthy stocks, I have to request that the County Instructor in Bee-keeping should be directed to make an inspection of any apiaries in his district in which he learns that bees have died and in any such instances in which there are traces of disease to have effective measures

taken to prevent the spread of infection. As so many weak stocks have succumbed, the opportunity would, it is suggested, be a favourable one for stamping out the disease by segregation.

I am, Sir,  
Your obedient Servant,  
T. P. GILL,  
*Secretary.*

The Secretary,  
County Committee of Agriculture.

## II.—TECHNICAL INSTRUCTION.

### SUMMER COURSES OF INSTRUCTION FOR TEACHERS.

The sixteenth series of Summer Courses, organised by the Department of Agriculture and Technical Instruction for Ireland, for Teachers in Technical, Secondary, and National Schools, opened on the 4th July at various centres in Dublin, and throughout the country, and will continue until the 28th July. The total number of teachers attending the Courses this year is about 370.

#### PARTICULARS OF THE COURSES AND TEACHING STAFF.

The following courses are being held at the Royal College of Science:—

##### WATER FOR INDUSTRIAL PURPOSES.

This Course is for teachers of Chemistry in Technical Schools, and is conducted by Dr. W. E. Adeney, D.Sc., F.I.C., F.C.S. (Temporary Professor of Chemistry, R.C.Sc.I.), assisted by Mr. H. G. Levingston (Assistant Demonstrator in Chemistry, R.C.Sc.I.).

##### COURSE IN PRACTICAL ELECTRICAL TESTING AND MEASUREMENTS.

This Course is for teachers of Technology and Physics in Technical Schools and teachers of the Special Course in Physics in Day Secondary Schools. The Course is conducted under the general direction of Professor W. Brown, B.Sc., M.I.E.E., by Mr. R. G. Allen, B.Sc., A.R.C.Sc.I., A.I.E.E. (Demonstrator in Electro-Technology, R.C.Sc.I.), assisted by Mr. J. W. O'Connell, A.R.C.Sc.I. (R.C.Sc.I.).

##### INTERNAL COMBUSTION ENGINES AND MOTOR CAR MECHANISM.

The Course has been arranged for teachers of Mechanical Engineering in Technical Schools, and is conducted by Mr. J. Taylor, M.A., A.R.C.Sc.I. (Lecturer on Mechanical Engineering, R.C.Sc.I.), assisted by Mr. F. G. Levingston, A.R.C.Sc.I. (R.C.Sc.I.).

##### COURSE IN TECHNOLOGY FOR TEACHERS OF INTRODUCTORY ENGLISH AND MATHEMATICS IN TECHNICAL SCHOOLS.

This Course is attended by National School Teachers, who give instruction as indicated in Technical Schools. The object of the Course is to indicate to such teachers the nature of the specialised

instruction, which will be subsequently taken up in succeeding sessions by their students, who are mainly of the Engineering and Building Trades types, and thus enable the teachers to make their instruction more truly preparatory to a specialised course. The Course is under the direction of Mr. G. E. Armstrong, M.Sc. (Principal, Municipal Technical School, Londonderry), who will be assisted by Mr. O. S. Spokes, A.I.E.E., Science Teacher in the same institution.

#### COURSE IN COMMERCIAL ARITHMETIC AND ECONOMIC GEOGRAPHY.

Courses in these subjects are being run conjointly and are attended by the same group of students who are teachers of elementary commercial subjects in Technical Schools. The Course is under the direction of Mr. A. Williamson, M.A. (Principal, Municipal Technical Institute, Rathmines), and Mr. W. Scott (Commercial Instructor, D.A.T.I.).

#### COURSE IN PRACTICAL MATHEMATICS AND MECHANICS.

This Course is intended for teachers of Building Trades and Engineering subjects in Technical Schools and for the further training of Manual Instructors, who have attended the special courses conducted by the Department. The Course is conducted by Mr. P. F. Gillies, B.Sc. (Principal, Municipal Technical School, Ballymena), assisted by Mr. F. W. Warwick, B.A., B.E., A.R.C.Sc.I. (Demonstrator in Engineering, R.C.Sc.I.).

#### COURSES IN HYGIENE AND SICK NURSING.

Intended for Domestic Economy Instructresses and District Nurses, who may desire to give instruction in the subject under local schemes of technical instruction. The purpose of the Course is to afford further practical knowledge of the laws of health and home nursing, so as to enable the students to introduce simple and well-directed instruction in these subjects into their teaching. The Courses are under the direction of Mrs. Ella Webb, M.D. (of Dublin), and Miss Marion Andrews, M.D. (of Belfast), assisted by Mrs. Heppel-Marr (City of Dublin Branch, British Red Cross Society), and Miss Chloe Bevis (Senior Medical Student, T.C.D.).

#### COURSES IN EXPERIMENTAL SCIENCE.

These Courses are attended by teachers in Secondary Schools, and instruction is given in Physics, Chemistry, and Physical and Commercial Geography. The several Courses are conducted by:—Dr. W. E. Adeney, D.Sc., F.I.C., F.C.S. (Temporary Professor of Chemistry, R.C.Sc.I.); Professor W. Brown, B.Sc., M.I.E.E. (Professor of Applied Physics, R.C.Sc.I.); Professor G. A. J. Cole, F.G.S., M.R.I.A. (Professor of Geology, R.C.Sc.I.); Mr. F. E. W. Hackett, M.A., M.Sc., Ph.D. (Lecturer in Physics, R.C.Sc.I.); Mr. A. G. Leonard, B.Sc., Ph.D., A.R.C.Sc.I. (Head Teacher, Chemistry Division, Crawford Municipal Technical Institute, Cork); Mr. W. J. Lyons, B.A., A.R.C.Sc. (Lond.) (Demonstrator in Physics, R.C.Sc.I.); Mr. A. O'Farrelly, M.A. (Lecturer in Organic Chemistry, R.C.Sc.I.); Mr. G. A. Watson, B.A., A.R.C.Sc.I. (Science Master, High School, Dublin); and Mr. A. Williamson, M.A. (Principal, Municipal Technical Institute, Rathmines); assisted by Miss

B. B. S. Dawson, A.R.C.Sc.I. (Temporary Assistant Demonstrator in Chemistry, R.C.Sc.I.); Mr. W. D. Douglas, A.R.C.Sc.I. (Assistant Demonstrator in Electro-Technology, R.C.Sc.I.); Mr. W. D. Haigh, B.A., A.R.C.Sc.I. (Demonstrator in Geology, R.C.Sc.I.); Mr. G. W. Harris, B.A. (Science Teacher, Christian Brothers' Schools, North Richmond Street, Dublin); Miss A. Hemphill, A.R.C.Sc.I. (Science Teacher, Victoria High School, Londonderry); Mr. D. Madden, A.R.C.Sc.I. (Demonstrator in Chemistry, University College, Galway); Mr. Wm. O'Riordan, A.R.C.Sc.I. (Demonstrator, University College, Dublin).

#### COURSES IN MANUAL TRAINING (WOODWORK).

These Courses are intended for Secondary School Teachers, who will receive instruction in Drawing in addition to instruction in the use of Woodworking tools. The Course is conducted by Mr. H. O. Armstrong (Principal, Municipal Technical School, Tralee), assisted by Mr. W. B. Jamison (Principal, Municipal Technical School, Carrickfergus).

The following Courses are being conducted at the Metropolitan School of Art:—

#### COURSE IN FURNITURE DESIGN.

This Course is intended for teachers in Cabinet-making and Woodwork. The instruction will include general principles of furniture and interior woodwork and accessory fixtures; the influence of material and fundamental constructions; enrichment by carving, inlay, painting, and metalwork. The study of historic examples, as precedents to original design, will form an important feature of the work. The Course is conducted by Mr. G. Atkinson, A.R.C.A., A.R.H.A. (Second Master, Metropolitan School of Art), assisted by Mr. H. J. Prosser (Manual Instructor, Cork County Joint Technical Instruction Committee).

#### COURSE IN LIFE DRAWING AND FIGURE COMPOSITION.

Intended for Art Teachers in Schools of Art and Technical Schools and for advanced Art Students. Opportunities will also be given, if desired, for study in the National Museum of Science and Art. The Course will be conducted by Mr. T. Derrick (of Glastonbury).

#### COURSE IN LITHOGRAPHY.

For Art Teachers in Schools of Art and Technical Schools. The Course will include lectures on the materials used, on the mixing of colours, etc., and practical work—drawing on stones, transferring printing by means of hand press, etc. Course under the direction of Mr. F. Ernest Jackson (Teacher of Lithography at the Central School of Arts and Crafts, Southampton Row, London).

#### COURSE IN LETTERING AND PROCESS WORK.

Intended for teachers in Schools of Art and Art Classes in Technical Schools, as a medium for instruction in Decorative Design. Course under the direction of Mr. C. Braithwaite, A.R.H.A. (Teacher of Lettering and Illumination at the Municipal Technical Institute,



Belfast), and Mr. F. Vaughan (Head of the School of Book Production, City of Dublin Technical Schools).

#### COURSE IN ORNAMENTAL LEATHERWORK.

This Course is intended for teachers in Schools of Art and Art Classes as a suitable craft for instruction and practice in Decorative Design, and for the further development of this form of work as a commercial possibility. The course is conducted by Miss E. E. Carter (of Stratford Court, London).

#### COURSE IN DRAWING AND MODELLING.

Intended for teachers in Secondary Schools who wish to become teachers of Drawing, but who are unable to obtain facilities, during the school session, for instruction and practice under fully qualified teachers. This Course is conducted by the Staff of the Metropolitan School of Art.

#### COURSES IN ADVANCED DRESSMAKING AND ADVANCED HOUSEWIFERY.

These Courses, which are being conducted at the Irish Training School of Domestic Economy, Kilmacud, Stillorgan, Co. Dublin, are intended for the further training of Domestic Economy Instructresses employed under local schemes of Technical Instruction. The Courses are under the direction of Miss R. Perkins (Teacher of Needlework and Dressmaking in the Training School), Miss C. A. Bright (Teacher of Housewifery, Training School of Cookery, etc., Liverpool), and Miss M. Small (of the Municipal Technical Institute, Belfast).

#### COURSES IN RURAL SCIENCE (INCLUDING SCHOOL GARDENING).

These Courses will not begin until the 8th August, and will close on the 1st September. They are held for the purpose of training National School Teachers to give instruction in the Programme in Rural Science (including School Gardening) issued by the Commissioners of National Education. The instruction will be given partly in the Royal College of Science for Ireland, and partly in the School Garden at the Albert Agricultural College, Glasnevin, and the Municipal School Garden, Eden Road Kingstown. The teaching staff includes Mr. D. Houston, F.L.S. (Lecturer on Agricultural Biology, R.C.Sc.I.); Mr. L. J. Humphrey (School Gardening Organiser, D.A.T.I.); Mr. P. O'Connor (Demonstrator, Botany Division, R.C.Sc.I.); Mr. H. A. E. Cooper (School Gardening Instructor, Cork County Joint Technical Instruction Committee); Mr. W. H. Johns, F.R.H.S. (of the Dublin School of Gardening); Mr. E. Sheehy (Demonstrator in Zoology, R.C.Sc.I.); Mr. J. Warnock (Marlborough Street Training College).

The foregoing Courses are all directly administered by the Department of Agriculture and Technical Instruction for Ireland. Other Courses are conducted at Convent Centres for teachers who are members of enclosed religious Orders, whilst the authorities of the Christian Brothers have arranged for Courses for members of that Order.

Courses will be held in Experimental Science and in Drawing and

Modelling similar to the courses conducted by the Department, whilst instruction will also be given in Domestic Economy to enable teachers to secure recognition from the Department as teachers of Domestic Economy in Secondary Schools.

The following are the courses to be held at local centres :—

*Ballyshannon : Convent of Mercy.*—Course in Drawing and Modelling. Instructress: Miss D. Mackey (Art Teacher, Coleraine Municipal Technical School).

*Belfast : St. Dominic's High School.*—Course in Domestic Economy, Instructress: Miss M. K. Donnelly (Domestic Economy Instructress, Municipal Technical School, Lurgan).

*Bruff : St. Mary's Convent.*—Course in Domestic Economy. Instructress: Miss N. Petit (Domestic Economy Instructress, Waterford Ursuline Convent, Higher School of Domestic Economy).

*Cashel : Presentation Convent.*—Course in Domestic Economy. Instructress: Miss F. L. Morris (Domestic Economy Instructress, Central Technical Institute, Waterford).

*Charleville : St. Joseph's Convent of Mercy.*—Course in Drawing and Modelling. Instructor: Mr. P. L. Squire (Art Teacher, City Technical School, Kilkenny).

*Cork : Christian Brothers' Schools, Our Lady's Mount.*—Course in Elementary Physics. Instructors: Rev. Brother P. V. Ryan, A.R.C.Sc.I., assisted by Rev. Brother D. F. Greenish and Rev. Brother J. M. Quinlan. Course in Elementary Chemistry. Instructors: Rev. Brother M. C. Wall, A.R.C.Sc.I., assisted by Rev. Brother J. S. Galvin.

*Dalkey : Loreto Abbey.*—Course in Drawing and Modelling. Instructor: Mr. H. C. Charde (Art Teacher, Crawford Municipal School of Art, Cork).

*Donnybrook : St. Mary's Dominican College.*—Course in Botany. Instructor: Mr. P. O'Connor (Demonstrator in Zoology, Royal College of Science for Ireland).

*Fermoy : Loreto Convent.*—Course in Domestic Economy. Instructress: Miss M. Phenix (Domestic Economy Instructress, Northlands School of Housewifery, Londonderry).

*Galway : Dominican Convent, Taylor's Hill.*—Instructress: Miss T. M. Kelly (Domestic Economy Instructress, Municipal Technical School, Newry).

\* *Kiltimagh : St. Louis' Convent.*—Course in Domestic Economy. Instructress: Miss M. Darling (Methodist College, Belfast).

*Monaghan : St. Louis' Convent.*—Course in Elementary Physics. Instructor: Mr. J. Brierley, M.Sc. (Science Teacher, Royal Academical Institution, Belfast). Course in Domestic Economy. Instructress: Miss J. F. E. Walsh, B.A. (Domestic Economy Instructress, Municipal Technical School, Londonderry).

*Newtownbarry : St. Mary's Convent.*—Courses in Elementary Physics and Elementary Chemistry. Instructor: Mr. Brice Moore

B.A., LL.B. (Principal, Academical Institute, Banbridge), assisted by Mother M. Gabriel Meade.

*Rathfarnham: Loreto Abbey.*—Course in Elementary Physics. Instructor: Mr. G. E. Ebrill, B.A. (Assistant in Chemistry, University College, Dublin). Course in Domestic Economy. Instructress: Miss E. Perry (Domestic Economy Instructress, Municipal Technical Institute, Rathmines).

*Sligo: Ursuline Convent.*—Course in Elementary Physics. Instructress: Sister M. Christine Madden, A.R.C.Sc.I.

*Thurles: Presentation Convent.*—Course in Elementary Physics. Instructor: Mr. A. M. Moynihan, B.A., A.R.C.Sc.I. (Science Master, Municipal Technical School, Queenstown).

*Tralee: Presentation Convent.*—Course in Domestic Economy. Instructress: Miss M. Saunders (Domestic Economy Instructress, Central Technical School, Clonmel).

### III.—TRANSITS AND MARKETS.

(Thirteenth List.)

#### DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

#### BUTTER AND MARGARINE ACT, 1907.

(Sections 8 and 14 (1).)

#### LIST OF NAMES APPROVED BY THE DEPARTMENT FOR USE IN CONNECTION WITH MARGARINE.

NOTE.—Approval by the Department authorises the use of the name in Ireland only. Approval does not confer on any person any exclusive right to the use of the name, nor authorise its use by any person not entitled to use it.

Blueband.  
Gold Bell.  
Gold Cup.  
Golden Cup.  
Green Band.  
Ivose.  
Mayblossom.  
Pheasant.  
Redband.  
Ricon.  
Rufose.  
Sana.  
Thimble Brand.  
Triangle.

OFFICES, 4 UPPER MERRION STREET,  
DUBLIN, 30th June, 1916.

#### IV.—VETERINARY.

DEPARTMENT OF AGRICULTURE AND  
TECHNICAL INSTRUCTION FOR IRELAND  
(VETERINARY BRANCH),  
50 AND 51 UPPER MOUNT STREET,  
DUBLIN.

#### MEMORANDUM AS TO SHEEP DIPPING IN IRELAND, ESPECIALLY WITH REGARD TO THE SHEEP DIP- PING (APPOINTMENT OF INSPECTORS) ORDER OF 1915.

In connection with the subject of Sheep Dipping in Ireland, the Department have thought it desirable to prepare the following memorandum for the information of members of County Councils and of others interested in Sheep Dipping administration.

Sheep Dipping has been a conspicuous success in Australia, the greatest sheep-rearing country in the world, and in New Zealand, where within a period of 10 years (1905-14) the stock of sheep increased from 19 to 25 millions. In Great Britain, too, the dipping regulations are proving growingly successful; but in Ireland they have hitherto been a comparative failure so far as the eradication of sheep scab is concerned, although the conditions in this country are particularly favourable to effective dipping. The explanation of so disappointing a result must, it is felt, lie in the fact that the dipping is not, in general, being properly carried out.

The Department have, therefore, been forced to the conclusion, since circumstances make it urgently necessary to obtain better results from the Sheep Dipping regulations, that some change of procedure is demanded. After full consideration of the matter they recently decided, as recommended by the Council of Agriculture, to require that all dipping for the purposes of these provisions should in future be done under supervision. The obligation has, accordingly, been imposed on all Irish Local Authorities to appoint Inspectors for the purpose of effectively carrying out such supervision on the Local Authorities' behalf. A copy of the Order imposing the obligation, entitled the Sheep Dipping (Appointment of Inspectors) Order of 1915, was sent to each Local Authority in due course, with a suggestion that the question of the number of Inspectors, or, where necessary, additional Inspectors, to be appointed in pursuance of it should receive early consideration.

The Department believe that in the cases of at least some Local Authorities the obligation of compliance with the essential requirement of the Order, and the reasons in favour of such requirement, have been obscured by certain objections put forward without a full knowledge of the facts. They desire, therefore, to offer, for the information of members of County Councils and others interested in Sheep Dipping administration, the following observations with regard to the objections in question. They hope thus to remove the misconceptions on which opposition to the Order appears to be based; and that, as a result, it will be unnecessary for the Department, in any instance, to put into operation their reserved powers, with a view to securing compliance with the Order.

**OBJECTION No. 1.**—That the requirement represents an arbitrary step taken without regard to the interests concerned.

The requirements represent the view of the Council of Agriculture as to the steps which the Department should take to secure that the efforts of those Local Authorities who regularly enforce Sheep Dipping should not be nullified through apathy on the part of other Local Authorities. The fact that hitherto the administrative activity of a Local Authority could thus be discounted has been a long standing source of complaint and has been the means of preventing many Local Authorities from actively enforcing the Sheep Dipping Order. For this reason, among others, the Department have for many years advocated the making of arrangements for the supervision of dipping in every County. The need for such a policy has been amply demonstrated by the failure, in a general sense, of the Sheep Dipping Orders, as hitherto administered to check the spread of Sheep Scab in Ireland, or to maintain the reputation of Irish sheep in British markets.

The export trade in sheep has, in consequence, suffered considerably from restrictions imposed in Great Britain in the interests of cross-channel flock-masters. Of late there have been many indications that the expediency of subjecting the trade to additional restrictions has become a pressing question with the British Authorities, who see in the number of cases of Sheep Scab which continue to occur among sheep imported from Ireland a constant menace to the satisfactory position with regard to that disease in which years of administrative effort have placed Great Britain. The consequences to be feared from the imposition of further restrictions on an Irish trade already gravely embarrassed are, it will be admitted, sufficiently serious to justify the taking of strong measures to avert them; but, apart from this consideration, it is plainly a matter of the first importance that the position of the country with regard to Sheep Scab should not continue to compare unfavourably with that of Great Britain.

In issuing the Sheep Dipping (Appointment of Inspectors) Order the Department believe they have adopted the surest and most direct means of securing the effective dipping of all sheep in Ireland, and thus removing the apprehension of further interference with the export trade, and at the same time achieving the main object of the Sheep Dipping Order—the control and eventual eradication of a disease which has done, and is doing, much harm to the Irish sheep industry in general.

**OBJECTION No. 2.**—That the supervision of dipping by Inspectors is unnecessary, having regard to the assistance in that direction given by the Police.

The assistance hitherto given by the Police has been confined to satisfying themselves, should they happen to be on patrol duty in the neighbourhood, that any dipping of which they receive notice is actually being carried on. They do not supervise the dipping process, nor could they be expected to undertake the duties of Dipping Inspectors. An extension of Police activity as regards dipping is being arranged for by the Inspector-General of Constabulary who has kindly complied with the request of the Department in this matter, but assistance from the Constabulary cannot,

as explained recently to a deputation from the General Council of Irish County Councils, be regarded as an efficient substitute for a system of thorough supervision, such as the Order is designed to secure, by Inspectors conversant with and specially appointed for the work.

As matters now stand, less than two-thirds of the stock of sheep in Ireland are declared by their owners to be dipped even in the Summer Dipping period, when only one dipping is prescribed. Of the sheep so declared to be dipped it is safe to assume, having regard to the general want of proper dipping appliances and to the difficulty of verifying declarations, that a large proportion are either dipped ineffectively or subjected to only a nominal dipping by way of perfunctory compliance with the Order. To show the necessity of competent supervision, it is only necessary to point out some of the ways in which dipping, even when carried out with the best intentions, may be rendered ineffective, e.g., by the use of an inefficient dipping preparation or the undue dilution of an approved dip; by incomplete immersion of the sheep or immersion for too short a time; by too infrequent renewal of the dipping fluid; or by allowing dipped and undipped sheep to mix together.

**OBJECTION No. 3.**—That the Sheep Dipping Order as at present carried out shows satisfactory results.

Since, as indicated in the preceding paragraph, the results of the present administration of the Order are very unsatisfactory as regards the number of sheep dipped or said to be dipped, it is inevitable that they should be unsatisfactory from the point of view of the ultimate object of the Sheep Dipping Order, viz., the eradication of Sheep Scab. The number of outbreaks, though relatively high, is not the only proof of this. Other and much more disquieting evidence is to be found in the number of cases of Sheep Scab discovered among sheep sent for shipment to, or after landing in, Great Britain. In 1915 the disease was detected on 58 occasions at Irish Ports, and 123 instances were discovered in Irish sheep across channel. In most of these cases the indications of disease were comparatively slight; in the cross-channel cases the fact that the disease escaped detection at the Irish Ports implies that it had not manifested itself to a sufficient degree to be noticeable during the period available for examination and observation prior to shipment.

The discovery of so many such cases—attended, it should be remarked, with considerable financial loss to the exporters concerned—points clearly to a much more widespread incidence of the disease than is revealed by the statistics of recorded outbreaks. The inference is, that many sources of infection exist which are either deliberately concealed, or remain unreported through ignorance or carelessness on the part of sheep owners or herds. Obviously, these unknown sources of infection are most likely to be found—as are, indeed, the greater number of those who are brought to light—amongst sheep belonging to persons who fail properly to observe the dipping requirements. It must be evident, therefore, that, so long as it is possible for even a minority of sheep owners to evade or disregard these provisions with impunity, the results of the Dipping Order must remain quite inadequate to the requirements of the case.

**OBJECTION No. 4.**—That the supervision of the dipping of all sheep in the country is not practicable.

Experience in certain portions of Ireland has proved that this view is an erroneous one. In the case of County Dublin, for example, out of the county's total stock of sheep (including lambs), as enumerated at the beginning of the Summer Dipping period last year, there were dipped before the 1st of August, under the supervision of the staff of Inspectors appointed by the Local Authority, no less than 91 per cent., or (allowing for the natural movement and depletion of the stock in the interval) practically all the sheep in the County. Furthermore, the securing of this result was found consistent with allowing owners to select their own times, etc., for dipping. The Department recognise, however, that in like circumstances in other counties an equally satisfactory result might not be attainable without the employment of an undue number of Inspectors; and they have accordingly issued a new Order which provides Local Authorities with means of economising the time and service of their Inspectors to the utmost. Under the new Order in question—the Sheep Dipping (Local Regulations) (Ireland) Order of 1916—a Local Authority may, if they wish, frame a Regulation, applicable to the whole or any part of their district, making it obligatory on every sheep owner therein to dip his sheep at such time and place as the Local Authority may direct. With a Regulation of the kind in force it should be practicable for any Local Authority to bring the work of supervision within the capacities of a comparatively small staff. Such a regulation would not preclude the Local Authority from endeavouring also to meet the convenience of those owners who might be desirous of carrying out the dipping, under supervision, in their own dipping baths.

**OBJECTION No. 5.**—That Sheep Scab is more prevalent in certain counties where dipping is supervised than in certain others where such supervision does not exist.

This objection is based, the Department believe, on a superficial reading of the statistics relating to the distribution of the outbreaks that have been brought under official notice. It appears to assume that Sheep Scab does not exist where it is not reported, whereas unreported or undetected disease is, in fact, the root of the evil which the policy of compulsory dipping is directed to suppress. As previously indicated (see 3), the ineffectiveness of the Sheep Dipping Order, as at present administered, is shown not so much in the proportion of the stock of sheep left undipped as in the fact that numerous undiscovered centres of infection manifestly continue to exist.

It has been the frequent experience of the Department, in attempting to trace the origin of disease detected among sheep shipped to, or presented for shipment to, Great Britain, that the diseased sheep have been found to have been purchased at a fair held in a county where few or no outbreaks of the disease have been recorded. Again, outbreaks on farms or mountain pastures have often been clearly attributable to sheep coming from such fairs. From the facts it is obvious that if sheep owners generally were vigilant in detecting and prompt in reporting disease among their flocks, the position would give much less ground for dissatisfaction

than at present although the number of recorded outbreaks would be greatly increased. In the case of a county where supervision of dipping is practised, conditions affording incentives to reporting, and affording also opportunities for detecting disease, are found which are entirely lacking in the case of a county where the Local Authority take no steps to have the dipping effectively carried out. This is, in itself, a very strong reason for requiring all Local Authorities to arrange for the supervision of dipping in their respective districts.

OBJECTION No. 6.—That the cost of supervision would be an oppressive burden on the ratepayer.

The Department are of opinion that a great deal of misconception exists upon this particular question of the expense of carrying out the Order. The cost, the Department are convinced, need not prove excessive. The Sheep Dipping (Local Regulations) Order, already referred to, offers means of reducing the work of supervision to a minimum, and a supervisory scheme, based on Regulations framed under that Order, and including the provision by the Local Authority of special facilities for dipping, should, to a large extent, be self-supporting. Under existing conditions (which, inasmuch as they allow owners to avail themselves of the public dipping facilities or not, as they please, do not make for the extensive use of public dipping apparatus) the Local Authorities who have combined supervision with the provision of such apparatus have recovered, on the average, over 30 per cent. of their expenses from dipping fees. In one small district, where the Local Authority's portable dipping tank was unusually well patronised, the net result showed an actual profit.

With Regulations in force whereby owners, especially those who have no dipping facilities of their own, can be required to bring their sheep to the public dipping-tank or station, the receipts from dipping fees should permit a very considerable offset to the Local Authority's expenditure. The following figures, although necessarily hypothetical, illustrate the possibility of an arrangement in which expenditure and receipts would practically balance each other :—

## EXPENDITURE.

	£	s.	d.
Wages of Inspector, 24 weeks @ £1 10s.	36	0	0
Hire of apparatus and cost of moving it from place to place	20	0	0
Cost of dip	20	0	0
Total	£76	0	0



Of course the difference between outlay and income may be affected in particular cases by many factors ; but it will be seen that, in any circumstances, the net cost of supervision may be kept within narrow limits. The above figures assume the existence of a provision for regulating, where needful, the times and places of dipping. In the absence of such provision the gap between expenditure and receipts would probably be wider ; but even then the inclusion in the dipping operations of the considerable number of sheep which usually escape dipping altogether should ensure a much more general resort to the public dipping place, and a substantial balance should accordingly be available towards payments of Inspector's wages. One-half the net cost will in any case be repayable from the General Cattle Diseases Fund.

Finally, in regard to the question of cost, the Department desire to emphasise strongly that, in view of the great value to the sheep farming industry and to the country of securing a clean bill of health for Irish sheep and in view of the magnitude of the losses threatened by the continuance of this disease, the comparatively small expense involved in taking proper measures for suppressing it is amply justified and will be compensated for many times over by the result.

**OBJECTION No. 7.**—That to require Local Authorities to appoint immediately a number of additional officers is directly opposed to the present policy of retrenchment in matters of public expenditure.

The Department fully realise that, however economically the Order may be carried out, one effect of it would be to throw some additional burden on the ratepayers of the country generally, at a time when economies in matters of public expenditure are urgently demanded. They had already in pursuance of the policy of retrenchment necessitated by the war, suspended the operation of the Order requiring the slaughter of cattle suspected of Tuberculosis, an Order which represented a charge on local funds of at least £10,000 a year. The work connected with the Tuberculosis Order can, however, be resumed without serious loss of efficiency after the war.

With regard to Sheep Dipping, on the contrary, every consideration calls for increased activity. The prevalence of Sheep Scab not only imperils the stability of the export trade in sheep on which the Irish sheep industry so largely depends, but seriously hinders the normal development of that industry in other ways. As matters stand, flock-owners cannot count on that reasonable immunity from the disease which is so essential a condition of prosperous sheep breeding and rearing, a circumstance which has undoubtedly contributed to the decline of the sheep industry for a number of years past. The recognised need for developing all our agricultural resources to meet the adverse economic conditions ensuing on the war gives additional importance to the question. Among these resources the sheep industry admittedly occupies an important place. In the circumstances, and seeing that dipping not only protects against Scab but destroys various parasites infesting sheep, and

improves the condition of the animals and their wool,\* the Department are, as already stated, convinced that the benefits to be expected from a measure designed to secure the full effect of the Sheep Dipping Order more than justify any reasonable expenditure that may be necessary to secure them. In any case, the cost of supervising dipping is not likely to exhaust the savings effected by the suspension of the Tuberculosis Order, but even if it were necessary to expend the whole of these savings (say) £10,000 a year, the expenditure could not be regarded as an excessive payment for the insurance of the Irish sheep industry, seeing that the present value of the stock of sheep in Ireland is estimated at eight millions sterling.

\* NOTE.—It may be well to refer in this connection to a view held in some quarters that where a poisonous dip is used injury to the sheep is apt to result from double dipping within an interval of 14 days as required in the Autumn period. Against this view—which is, of course, contrary to that of users of dips generally—may be cited the experience of the Department's own Inspectors in supervising the double dippings carried out in various special dipping areas in Ireland from time to time. The operations in these areas conclusively prove that even with an arsenical dip the prescribed interval is not too short for safety, provided the bath is not of excessive strength and the sheep are handled properly in the dipping process. The interval of not less than 7, nor more than 14 days, has been fixed as a result of extensive field and laboratory experiments which go to show that, as regards the elimination of the sheep-scab parasite, the efficacy of double dipping is doubtful if more than 14 days be allowed to elapse between the first dipping and the second. In any case there is no obligation to use a poisonous dip for either of the dippings, many non-poisonous preparations being included in the Department's list of approved dips.

## NOTES AND MEMORANDA.

A Meeting of the Agricultural Board was held at the Offices of the Department, 4 Upper Merrion Street, on **Meeting of the Agricultural Board.** Wednesday, 21st June, 1916. The following attended :—The Right Hon. T. W. Russell, M.P., Vice-President of the Department (in the Chair); Mr. John Bourke; Mr. Alexander L. Clark, J.P.; Alderman Henry Dale, J.P.; Very Rev. Canon Daly, D.D., P.P.; Col. Sir N. T. Everard, Bart., H.M.L.; Mr. John P. Hayden, M.P.; Most Rev. Denis Kelly, D.D., Lord Bishop of Ross; Mr. John S. F. M'Cance, J.P., D.L.; Mr. George Murnaghan, J.P.; Mr. John D. O'Farrell; Mr. Patrick J. O'Neill, J.P.; Mr. T. P. Gill, Secretary of the Department; Mr. J. R. Campbell, B.Sc., Assistant Secretary in respect of Agriculture; Mr. J. S. Gordon, B.Sc., Deputy Assistant Secretary in respect of Agriculture and Chief Agricultural Inspector; Mr. T. Butler, Superintendent of the Statistics and Intelligence Branch; Mr. J. P. Walsh, Clerk in Charge of Accounts; Mr. J. V. Coyle, B.L., Senior Staff Officer; and Mr. F. J. Meyrick, M.A., were also present. Mr. J. V. Coyle acted as Secretary to the Meeting.

The Board had under consideration the County and other schemes for the ensuing year, and concurred in the financial arrangements submitted in connection therewith.

The Board also gave special consideration to the question of the spraying of the potato crop, and deemed it advisable to publish the following statement :—

### POTATO SPRAYING—WARNING TO FARMERS.

The Board desire to impress most strongly upon farmers the necessity for having their potatoes well sprayed in good time, in view of the backwardness of the present season and of the fact that blight has already made its appearance in certain localities. The crop this year is late and plants are making slow growth, and as the disease may be expected to make rapid headway if the weather becomes warm and damp, special precautions are required to prevent the foliage being destroyed by blight early in the season. To neglect these precautions would result in the yield falling well below the average, which, from a national point of view, would be disastrous. No effort should be spared to increase the production of food this year, when all classes of foodstuffs will be dear.

The cost of spraying materials has increased, and, since there is no prospect of prices falling, there is grave danger that some farmers may be disposed to delay, or indeed neglect altogether to spray.

There is, however, no justification for such hesitation, inasmuch as the increased yield resulting from spraying will, even at the enhanced price of the materials, still leave a substantial profit on the crop.

Merchants are experiencing delay in the delivery of sulphate of copper, and some of them have deferred ordering their usual supplies until it is evident that a demand exists among farmers. The Board, therefore, urge all farmers to place their orders for spraying materials without delay.

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A meeting of the Board of Technical Instruction was held at the offices of the Department, 4 Upper Merrion Street, on the 19th July, 1916. The following members attended: The Right Hon. T. W. Russell, M.P., Vice-President of the Department (in the Chair); Mr. Andrew Beattie, J.P., D.L.; Rev. Henry Evans, D.D., M.R.I.A., F.I.H.; Most Rev. Bernard Hackett, D.D., Lord Bishop of Waterford and Lismore; Mr. William Macartney, J.P.; Mr. Francis M'Bride, J.P.; Rev. P. J. Manly, P.P.; Alderman W. J. Moore, J.P.; Mr. Richard Sisk; Mr. Alexander Taylor.

Mr. T. P. Gill, Secretary of the Department; Mr. George Fletcher F.G.S., Assistant Secretary in respect of Technical Instruction; Mr. Thomas Butler, Superintendent of the Statistics and Intelligence Branch; Mr. W. Vickers Dixon, B.A., Senior Inspector of Technical Instruction; Mr. J. V. Coyle, B.L., Senior Staff Officer, and Mr. A. Kelly were also present.

Mr. J. V. Coyle acted as Secretary to the Meeting.

Technical Instruction schemes in respect of the session 1916-17 were considered and approved.

The Board had also under consideration the following matters:—Science teaching in Secondary Schools; Summer courses for teachers; Trade and Industrial Scholarships; Apprenticeship Scholarships; provision for the maintenance of the Irish Training School of Domestic Economy and for the Killarney School of Housewifery.

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As announced in the issue of this JOURNAL for April last, and as advertised in the newspaper Press, the Department offered this year a number of Industrial and Trade Scholarships. The object of the Industrial Scholarships is to enable selected persons engaged for at least two years in a woollen mill in Ireland, to undergo a course of instruction in a suitable institution, with a view to further training in one of the

following branches of the industry:—(1) Blending, Carding and Spinning, (2) Designing, (3) Dyeing, (4) Milling and Finishing, (5) Weaving. The object of the Trade Scholarships is to enable apprentices engaged in certain specific industries in Ireland to obtain systematic instruction in the principles of science and art as applied to these industries.

A report on the action taken by the Department is set out below.

(a) *Industrial Scholarships.*

Five applications were received for the Scholarships in connection with the Woollen Industry which the Department offered under this Scheme. One of the applicants failed to pass the qualifying examination. Scholarships have been awarded to the remaining four applicants. The Scholars will attend a course of instruction, specially designed for this purpose, at the South of Scotland Central Technical College, Galashiels, during the coming session.

The names of the successful applicants, and the Mills in which they are engaged, are as follows:—

<i>Names of Applicants.</i>	<i>Mills in which they are engaged.</i>
Gibney, Michael Joseph . . . .	City Woollen Mills, Dublin.
Rafferty, Bertie . . . .	Messrs. Rafferty & Sons, The Claddagh, Galway
Jamieson, Robert . . . .	Messrs. O'Brien Bros., Ltd., Douglas, Cork.
Kehoe, John . . . .	Ormonde Woollen Mills, Kilkenny.

(b) *Trade Scholarships.*

The Department offered Scholarships in connection with Printing and Book Production, Motor Engineering, and Cotton and Linen Bleaching and Dyeing. It is to be regretted that only two applications were received for the last-named group, and the Department were consequently unable to award Scholarships in the section.

SCHOLARSHIPS IN PRINTING AND BOOK PRODUCTION.

Eleven applications were received for these Scholarships, and they all satisfied the Department's requirements as regards general education. Scholarships have, accordingly, been awarded to all the applicants. The Scholarships will be held at a special course of instruction conducted at the City of Dublin Technical Schools during the coming session.

The names of the applicants and the works in which they are engaged are as follows :—

<i>Names of Applicants.</i>	<i>Works in which they are engaged.</i>
Conroy, Joseph P. . . .	Carey's Printing Works, Maryborough.
Desmond, Robert E. . . .	Messrs. Purcell & Co., Cork.
Foley, Cornelius . . . .	Messrs. Landon Bros., Cork.
Kelleher, Cornelius Joseph . . . .	Shandon Printing Works, Cork.
Keogh, Denis . . . .	The Educational Co. of Ireland, Dublin.
Lowrey, Thomas . . . .	Jordan's Printing Works, Belfast.
MacBride, Henry N. . . .	Messrs. M'Bride & Son, Belfast.
M'Killip, Michael J. . . .	Messrs. Gynn & Co., Larne.
Mathews, Ephraim . . . .	Messrs. Hely's, Ltd., Dublin.
O'Reilly, John T. . . .	O'Gorman's Printing Works, Galway.
Tucker, Edward G. W. . . .	Milford Lewis, Dublin.

#### SCHOLARSHIPS IN MOTOR ENGINEERING.

Eleven applications were received for these Scholarships. Ten of the applicants satisfied the Department's requirements in regard to general education and have been awarded Scholarships. The remaining applicant did not present himself for the qualifying examination.

The Scholarships will be held at a special course of instruction at the Pembroke Technical School, Ringsend, during the coming session.

The names of the applicants and the works in which they are engaged are as follows :—

<i>Names of Applicants.</i>	<i>Works in which they are engaged.</i>
Deignan, Michael J. . . .	Murphy's Cycle and Motor Works, Birr.
Fitzpatrick, Edward J. . . .	Messrs. F. Aldritt & Sons, Maryborough.
Hughes, Herbert W. . . .	M'Gee's Motor Works, Drogheda.
M'Loughlin, Vincent . . . .	Poole's Motor Works, Tullamore.
Maguire, Stirling Hubert . . . .	Maguire's Motor Works, Enniskillen.
Savage, John . . . .	Messrs. M'Cowen & Sons, Ltd., Tralee.
Slattery, Cornelius . . . .	Slattery's Motor Works, Bandon.
Smyth, Charles . . . .	Messrs. Browne & Ramsay, Ltd., Dublin.
Stuart, Robert S. G. . . .	Messrs. Stuart & Co., Coleraine.
Tierney, Francis F. . . .	Messrs. Harry Ferguson, Ltd., Dublin.

## STATISTICAL

## FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast. *(Erris Head to Torr Head).				East Coast. (Torr Head to Carnsore Point).			
	1916.		1915		1916.		1915.	
	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
	Cw.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, . . . . .	—	—	—	—	13	45	7	22
Soles, . . . . .	—	—	1	5	15	95	15	81
Turbot, . . . . .	—	—	—	—	10	65	4	20
Total Prime Fish,	—	—	1	5	38	205	26	123
Cod, . . . . .	26	45	42	27	2,385	3,347	1,488	1,552
Conger Eel, . . . . .	6	2	2	1	24	41	116	87
Haddock, . . . . .	12	16	74	53	26	36	20	25
Hake, . . . . .	—	—	—	—	72	214	255	432
Herrings, . . . . .	13	14	73	30	1,370	863	502	133
Ling, . . . . .	—	—	—	—	1	1	49	35
Mackerel, . . . . .	137	83	112	19	—	—	—	—
Plaice, . . . . .	135	162	234	263	271	517	339	516
Ray or Skate, . . . . .	47	17	132	38	78	90	141	75
Sprats, . . . . .	—	—	—	—	—	—	—	—
Whiting, . . . . .	—	—	15	12	968	1,258	1,100	1,062
All other except Shell Fish	37	48	5	3	559	448	651	455
Total, . . . . .	413	387	690	451	5,702	7,020	4,687	4,495
SHELL FISH:—	No.		No.		No.		No.	
Crabs, . . . . .	380	3	1,865	12	—	—	564	5
Lobsters, . . . . .	504	16	1,016	28	876	43	2,204	85
Mussels, . . . . .	—	—	—	—	—	—	60	11
Oysters, . . . . .	—	—	—	—	—	—	2,398	4
Other Shell Fish, . . . . .	Cwt.		Cwt.		Cwt.		Cwt.	
	164	36	80	14	49	32	258	94
Total, . . . . .	—	55	—	54	—	75	—	199
Total value of Fish landed	—	442	—	505	—	7,095	—	4,694

NOTE—The above figures are subject to monthly returns previous to and including December, 1914, the extent of each of the Coast—Torr Head to Carnsore Point; South Coast—Carnsore

## TABLES.

## IRELAND.

as landed on the IRISH COASTS during the month of April, 1916, as corresponding period in 1915.

South Coast. (Carnsore Point to Loop Head).				West Coast. (Loop Head to Erris Head).				Total.			
1916.		1915.		1916.		1915.		1916.		1915.	
Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
11	46	9	19	—	—	1	5	24	91	17	46
67	391	50	270	6	25	10	41	83	511	76	397
5	24	6	30	4	21	6	24	19	110	16	74
83	461	65	319	10	46	17	70	131	712	109	517
12	17	17	23	33	52	40	21	2,456	3,461	1,587	1,623
8	8	2	1	12	9	—	—	50	60	120	89
—	—	2	2	12	24	19	36	50	76	115	116
—	—	—	—	—	—	—	—	72	214	255	432
2,041	2,211	6,561	1,315	2	2	18	12	3,426	3,090	7,154	1,490
10	12	96	77	14	12	58	40	25	25	203	152
17,085	14,741	19,345	7,556	258	163	733	224	17,480	14,987	20,190	7,799
115	209	120	163	11	9	29	32	532	897	722	974
84	45	137	44	5	2	25	7	214	154	435	164
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	9	3	—	—	977	1,261	1,115	1,074
141	248	124	78	24	22	347	100	761	766	1,127	636
19,579	17,952	26,469	9,578	390	344	1,286	542	26,174	25,703	33,132	15,066
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
136	—	307	4	—	—	—	—	380	3	2,736	21
Cwt.	7	837	42	Cwt.	—	Cwt.	—	1,516	66	4,057	155
—	—	—	—	—	—	—	—	—	—	60	11
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
201	46	280	37	506	92	423	193	920	206	1,041	338
—	53	—	83	—	92	—	193	—	275	—	529
—	18,005	—	9,661	—	436	—	735	—	25,978	—	15,595

to correction in Annual Returns.

Coasts referred to therein was as follows :—North Coast—Rossan Point to Torr Head ; East Point to Kenmare ; West Coast—Kenmare to Rossan Point.



## FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast. *(Erris Head to Torr Head.)				East Coast; (Torr Head to Carnsore Point.)			
	1916.		1915.		1916.		1915.	
	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, . . . . .	9	7	1	2	7	27	5	10
Solea, . . . . .	10	31	18	70	13	87	12	68
Turbot, . . . . .	—	—	11	39	5	23	2	10
Total Prime Fish, .	19	38	30	111	25	135	19	88
Cod, . . . . .	29	38	8	7	677	1,428	313	534
Conger Eel, . . . .	2	4	1	1	111	127	130	110
Haddock, . . . . .	44	62	75	68	26	40	9	14
Hake, . . . . .	—	—	—	—	532	1,136	300	523
Herrings, . . . . .	7,357	6,623	4,628	2,528	478	484	912	479
Ling, . . . . .	2	3	—	—	31	35	43	38
Mackerel, . . . . .	874	541	202	68	—	—	—	—
Plaice, . . . . .	277	287	350	325	498	805	191	296
Ray or Skate, . . .	215	68	612	157	248	175	283	212
Sprats, . . . . .	—	—	—	—	—	—	—	—
Whiting, . . . . .	32	46	29	25	291	386	448	549
All other except Shell Fish	19	32	40	35	484	488	268	232
Total, . . . . .	8,870	7,742	5,975	3,325	3,401	5,239	2,916	3,075
SHELL FISH:—	No.		No.		No.		No.	
Crabs, . . . . .	829	7	1,438	11	1,476	16	3,749	30
Lobsters, . . . . .	1,616	64	1,942	60	1,997	86	3,037	112
Mussels, . . . . .	—	—	—	—	—	—	126	22
Oysters, . . . . .	—	—	—	—	—	—	—	—
Other Shell Fish, .	—	—	168	27	51	30	88	27
Total, . . . . .	—	71	—	98	—	132	—	191
Total value of Fish landed	—	7,813	—	3,423	—	5,371	—	3,266

NOTE.—The above figures are subject  
\* In monthly returns previous to and including December, 1914, the extent of each  
Torr Head; East Coast—Torr Head to Carnsore Point; South Coast—

## IRELAND.

as Landed on the Irish Coasts during the month of May, 1916, as corresponding period in 1915.

South Coast. (Carnsore Point to Loop Head.)				West Coast. (Loop Head to Erris Head.)				Total.			
1916.		1915.		1916.		1915.		1916.		1915.	
Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.	Quan- tity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
6	24	7	14	—	—	—	—	22	58	13	26
23	128	39	184	12	44	12	40	58	283	81	362
2	9	3	11	9	39	14	43	16	76	30	103
31	161	49	209	21	83	26	83	96	417	124	491
18	22	12	6	10	5	47	10	734	1,493	380	557
28	25	17	9	39	28	76	33	180	184	224	153
—	—	3	2	2	2	7	7	72	104	94	91
—	—	—	—	—	—	—	—	532	1,136	300	523
15,647	11,199	12,409	4,877	154	73	285	122	23,636	18,379	18,234	8,006
15	17	4	3	20	12	110	33	68	67	157	74
45,339	20,819	19,567	9,052	6,621	3,094	3,303	1,099	52,834	24,454	23,072	10,219
94	206	99	146	67	79	11	11	936	1,377	651	778
92	66	190	70	146	107	69	14	701	416	1,154	463
—	—	—	—	7	3	—	—	7	3	—	—
—	—	2	1	—	—	—	—	323	432	479	575
46	35	45	37	186	146	180	123	735	701	533	427
61,310	32,550	32,397	14,412	7,273	3,632	4,114	1,535	80,854	49,163	45,402	22,347
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
—	—	456	5	—	—	—	—	2,305	23	5,643	46
2,615	123	4,504	198	1,524	46	3,685	105	7,752	319	13,168	475
Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
—	—	—	—	—	—	—	—	—	—	126	22
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
—	—	—	—	—	—	—	—	—	—	—	—
Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
144	21	176	21	532	111	368	66	727	162	800	141
—	144	—	224	—	157	—	171	—	504	—	684
—	32,694	—	14,636	—	3,789	—	1,706	—	49,667	—	23,031

to correction in Annual Returns.  
of the Coasts referred to therein was as follows :—North Coast—Rossan Point to Carnsore Point to Kenmare ; West Coast—Kenmare to Rossan Point.

## FISHERY STATISTICS—

STATEMENT of the Total QUANTITY and VALUE of the FISH returned compared with the

Kinds of Fish.	North Coast. * (Erris Head to Torr Head.)				East Coast. (Torr Head to Carnsore Point.)			
	1916.		1915.		1916.		1915.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
Brill, . . . . .	1	1	19	22	8	44	1	3
Soles, . . . . .	41	141	40	159	28	217	39	200
Turbot, . . . . .	1	6	9	34	8	69	10	50
Total Prime Fish, . .	43	148	68	215	44	330	50	353
Cod, . . . . .	35	39	3	3	520	1,020	216	344
Conger Eel, . . . . .	—	—	1	1	120	154	120	103
Haddock, . . . . .	39	22	—	—	17	30	61	77
Hake, . . . . .	—	—	—	—	1,208	2,384	840	1,282
Herrings, . . . . .	5,891	4,304	2,396	2,077	8,441	6,784	13,822	8,900
Ling, . . . . .	—	—	3	3	36	27	71	44
Mackerel, . . . . .	1,319	321	1,298	295	201	66	270	43
Plaice, . . . . .	330	363	380	367	430	736	228	393
Ray or Skate, . . . .	127	45	196	49	238	143	181	123
Sprats, . . . . .	—	—	—	—	—	—	—	—
Whiting, . . . . .	63	45	45	24	366	547	116	192
All other except Shell Fish	128	85	245	153	638	591	415	339
Total, . . . . .	7,975	5,372	4,635	3,187	12,259	12,812	16,390	12,093
SHELL FISH :— . . . .	No.	No.	No.	No.	No.	No.	No.	No.
Crabs, . . . . .	7,162	44	15,559	59	7,918	50	10,625	68
Lobsters, . . . . .	4,465	156	5,396	179	3,630	134	3,799	126
Mussels, . . . . .	—	—	40	4	20	3	—	—
Oysters, . . . . .	—	—	—	—	—	—	—	—
Other Shell Fish, . .	—	—	34	5	78	42	177	65
Total, . . . . .	—	200	—	247	—	229	—	259
Total value of Fish landed	—	5,572	—	3,434	—	13,041	—	12,352

NOTE.—The above figures are subject  
\* In monthly returns previous to and including December, 1914, the extent of each  
Head; East Coast—Torr Head to Carnsore Point; South Coast—

## IRELAND.

as landed on the IRISH COASTS during the month of June, 1916, as corresponding period in 1915.

South Coast. (Carnsore Point to Loop Head.)				West Coast. (Loop Head to Erris Head.)				Total.			
1916.		1915.		1916.		1915.		1916.		1915.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£	Cwt.	£
6	22	6	11	—	—	—	—	15	67	26	36
43	208	45	193	102	561	20	95	214	1,127	144	647
4	16	2	8	12	46	13	44	25	137	34	136
53	246	53	212	114	607	33	139	254	1,331	204	819
37	37	21	20	7	4	51	10	599	1,100	291	377
93	62	79	42	56	32	82	32	269	248	282	178
—	—	—	—	—	—	8	7	56	52	69	84
11	12	6	5	—	—	—	—	1,219	2,396	846	1,287
20,816	13,528	11,278	9,293	325	190	566	244	35,473	24,806	23,062	20,514
36	38	32	38	8	6	130	35	80	71	236	120
24,540	9,768	12,560	6,982	7,309	2,252	4,650	1,681	33,369	12,407	18,778	9,001
85	158	84	116	46	65	27	27	891	1,322	719	903
86	44	132	55	157	120	102	19	608	352	611	246
—	—	—	—	—	—	—	—	—	—	—	—
4	9	6	5	—	—	—	—	433	601	167	221
62	50	130	68	380	305	268	136	1,208	1,031	1,058	696
45,823	23,952	24,381	16,836	8,402	3,581	5,917	2,330	74,459	45,717	51,323	34,446
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
408	4	865	7	—	—	—	—	15,488	98	27,049	134
11,028	435	16,993	551	10,850	341	22,684	630	29,973	1,066	48,872	1,486
Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
—	—	—	—	—	—	—	—	20	3	40	4
No.	—	No.	—	No.	—	No.	—	No.	—	No.	—
—	—	—	—	—	—	—	—	—	—	—	—
Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—	Cwt.	—
129	27	174	27	194	41	220	37	401	110	605	134
—	466	—	585	—	382	—	667	—	1,277	—	1,758
—	24,418	—	17,421	—	3,963	—	2,997	—	46,994	—	36,204

to correction in Annual Returns.

of the Coasts referred to therein was as follows: North Coast—Rossan Point to Torr Carnsore Point to Kenmare; West Coast—Kenmare to Rossan Point.

STATEMENT of the TOTAL QUANTITY of FISH landed on the ENGLISH and WELSH COASTS during the Month and Six Months ended 30th June, 1916, compared with the corresponding periods of the Year 1915.

KINDS OF FISH.	June.		Six months ended 30th June.	
	1916.	1915.	1916.	1915.
	QUANTITY.			
	Cwt.	Cwt.	Cwt.	Cwt.
Brill, . . . . .	797	610	3,704	4,495
Soles, . . . . .	2,569	2,445	10,265	15,486
Turbot, . . . . .	858	1,868	6,851	13,166
Prime Fish not separately distinguished, . . . . .	—	—	—	—
Total Prime Fish, . . . . .	4,224	4,923	20,820	33,147
Bream, . . . . .	2,377	875	9,374	16,010
Catfish, . . . . .	8,958	9,135	23,235	26,109
Coalfish, . . . . .	17,122	8,491	85,525	96,432
Cod, . . . . .	138,717	135,941	676,265	944,767
Conger Eels, . . . . .	3,153	5,799	13,506	28,054
Dabs, . . . . .	6,148	6,890	27,634	41,141
Dogfish, . . . . .	3,742	2,387	20,340	18,001
Dory, . . . . .	23	42	159	324
Flounders or Flukes, . . . . .	261	209	1,641	1,649
Gurnards, . . . . .	4,923	4,843	22,939	26,892
Haddock, . . . . .	119,374	123,493	409,844	568,923
Hake, . . . . .	21,856	14,266	55,070	97,069
Halibut, . . . . .	3,403	3,367	9,561	12,612
Latchets (Tubs), . . . . .	157	344	280	664
Lemon Soles, . . . . .	3,674	2,287	12,510	10,484
Ling, . . . . .	4,993	5,082	32,791	36,563
Megrims, . . . . .	21,146	2,219	7,040	11,455
Monks (or Anglers), . . . . .	1,682	1,545	9,612	10,268
Mullet (Red), . . . . .	1	—	66	3
Plaice, . . . . .	17,716	16,019	104,713	120,526
Pollack, . . . . .	283	391	3,454	10,491
Skates and Rays, . . . . .	18,105	22,034	90,635	112,664
Torsk, . . . . .	322	1,697	1,214	5,849
Whiting, . . . . .	10,325	11,964	74,592	96,481
Witches, . . . . .	1,817	345	5,775	3,527
Herrings, . . . . .	48,696	3,192	68,323	12,713
Mackerel, . . . . .	37,907	19,717	114,860	211,140
Mullet (Grey), . . . . .	15	16	675	628
Pilchards, . . . . .	3	26	155	28
Sprats, . . . . .	—	—	21,496	49,511
Whitebait, . . . . .	267	600	1,874	2,430
Fish not separately distinguished, . . . . .	9,821	12,304	66,749	84,899
Total Wet Fish, . . . . .	492,211	420,443	2,002,777	2,691,454
Shell Fish:—	No.	No.	No.	No.
Crabs, . . . . .	661,144	786,071	2,614,521	3,011,558
Crawfish (Grayfish) . . . . .	4,488	4,194	6,876	7,399
Lobsters, . . . . .	54,442	68,206	210,492	213,758
Oysters, . . . . .	145,000	439,002	17,412,538	13,836,409
Other Shell Fish, . . . . .	Cwt. 13,121	Cwt. 30,601	Cwt. 178,316	Cwt. 239,334

NOTE.—The figures for 1916 are subject to revision.  
In addition 74,137 cwts. were reported to have been landed at English and Welsh ports by Belgian fishing vessels during the Six months.

STATEMENT of the TOTAL VALUE of FISH landed on the ENGLISH and WELSH COASTS during the Month and Six Months ended 30th June, 1916, compared with the corresponding periods of the Year 1915.

KINDS OF FISH.	June.		Six months ended 30th June.	
	1916.	1915.	1916.	1915.
	VALUE.			
	£	£	£	£
Brill, . . . . .	3,962	2,546	20,031	19,104
Soles, . . . . .	19,839	17,482	94,827	119,184
Turbot, . . . . .	5,622	8,604	42,984	61,862
Prime Fish not separately distinguished, . . . . .	—	—	—	—
Total Prime Fish, . . . . .	29,423	28,632	157,842	200,150
Bream, . . . . .	1,924	861	10,430	13,555
Catfish, . . . . .	9,797	9,238	34,642	25,748
Coalfish, . . . . .	12,356	7,280	72,282	61,136
Cod, . . . . .	171,290	164,774	1,023,795	1,011,799
Conger Eels, . . . . .	4,655	6,808	27,965	29,111
Dabs, . . . . .	9,354	10,952	52,403	77,392
Dogfish, . . . . .	2,670	1,361	14,958	9,934
Dory, . . . . .	48	61	336	464
Flounders or Flukes, . . . . .	386	288	2,485	1,746
Gurnards, . . . . .	3,010	3,080	16,189	15,115
Haddock, . . . . .	140,898	169,020	718,602	770,283
Hake, . . . . .	48,352	28,815	133,843	178,388
Halibut, . . . . .	15,433	13,264	47,370	54,350
Latchets (Tubs), . . . . .	158	389	354	728
Lemon Soles, . . . . .	14,384	8,924	55,919	40,729
Ling, . . . . .	6,237	5,557	45,160	33,479
Megrim, . . . . .	4,337	3,619	16,045	18,649
Monks (or Anglers), . . . . .	2,205	1,581	13,061	9,046
Mullet (Red), . . . . .	3	—	338	13
Plaice, . . . . .	54,661	46,102	332,525	304,259
Pollack, . . . . .	367	493	5,990	9,478
Skates and Rays, . . . . .	23,440	24,523	132,918	121,299
Torsk, . . . . .	379	1,003	1,690	3,709
Whiting, . . . . .	14,386	18,519	125,605	125,214
Witches, . . . . .	5,500	965	17,322	8,457
Herrings, . . . . .	34,910	2,510	63,137	11,469
Mackerel, . . . . .	32,947	18,605	107,403	140,258
Mullet (Grey), . . . . .	47	44	977	918
Pilchards, . . . . .	3	22	135	23
Sprats, . . . . .	—	—	7,475	9,215
Whitebait, . . . . .	441	1,065	2,819	4,031
Fish not separately distinguished, . . . . .	10,294	12,255	75,215	69,369
Total Wet Fish, . . . . .	654,345	590,610	3,317,230	3,359,514
Shell Fish:—				
Crabs, . . . . .	8,047	9,317	31,270	32,043
(Crawfish (Crayfish), . . . . .	358	384	563	627
Lobsters, . . . . .	2,825	3,159	11,272	10,264
Oysters, . . . . .	240	475	52,936	42,408
Other Shell Fish, . . . . .	9,017	11,180	50,392	55,348
Total Shell Fish, . . . . .	20,487	24,515	146,433	140,690
Total Value . . . . .	674,832	615,125	3,463,663	3,500,204

NOTE.—The figures for 1916 are subject to revision.

STATEMENT of the TOTAL QUANTITY of the FISH landed on the SCOTTISH COASTS during the Month and Six Months ended 30th June, 1916, compared with the corresponding periods of the year 1915.

KINDS OF FISH.	June.		Six Months ended 30th June.	
	1916.	1915.	1916.	1915.
	Quantity			
	Cwts.	Cwts.	Cwts.	Cwts.
Herrings . . . . .	249,136	70,668	789,269	300,922
Sprats . . . . .	—	—	376	2,344
Sparlings . . . . .	—	1	76	142
Mackerel . . . . .	7,459	7,161	15,015	8,618
Cod and Codling . . . . .	35,382	33,373	233,015	264,395
Ling . . . . .	3,635	8,437	14,643	56,757
Torsk (Tusk) . . . . .	354	894	1,077	6,575
Saith (Coal Fish) . . . . .	14,412	8,266	49,076	83,534
Haddocks . . . . .	56,172	48,285	233,110	240,915
Whittings . . . . .	14,609	10,761	42,361	40,224
Conger Eels . . . . .	336	718	5,017	8,244
Gurnards . . . . .	361	265	2,549	1,719
Catfish . . . . .	2,560	3,026	9,375	15,577
Monks (Anglers) . . . . .	696	612	3,594	5,090
Hake . . . . .	104	373	1,899	3,612
Squids . . . . .	—	—	2	26
Turbot . . . . .	122	76	1,132	1,299
Halibut . . . . .	1,504	2,085	4,596	9,539
Lemon Soles . . . . .	2,029	1,933	7,811	11,263
Flounders . . . . .	417	613	2,040	2,731
Plaice . . . . .	2,229	1,407	16,775	15,929
Brill . . . . .	3	6	12	51
Dabs . . . . .	1,011	660	3,921	3,451
Witches . . . . .	411	52	2,263	1,325
Megrim . . . . .	146	399	551	6,203
Skates and Rays . . . . .	5,173	8,060	24,671	58,032
Unclassified kinds . . . . .	691	172	2,746	1,301
Totals . . . . .	388,952	208,303	1,466,972	1,149,818
	No.	No.	No.	No.
Shell Fish :—				
Crabs . . . . .	225,525	235,719	867,719	813,921
Lobsters . . . . .	47,559	60,823	179,008	232,486
Oysters . . . . .	4,275	16,700	200,931	251,524
	Cwts.	Cwts.	Cwts.	Cwts.
Clams . . . . .	540	765	21,801	6,705
Mussels . . . . .	12,300	15,454	66,172	72,843
Unclassified . . . . .	2,906	3,260	14,798	27,972

NOTE.—Landed by Foreign Vessels during the Six Months ended 30th June, 1916 (not included above), nil cwts.  
The above figures are subject to correction in the Board's Annual Report.

STATEMENT of the TOTAL VALUE of the FISH landed on the SCOTTISH COASTS during the Month and Six Months ended 30th June, 1916, compared with the corresponding periods of the year 1915.

KINDS OF FISH.	June.		Six Months ended 30th June.	
	1916.	1915.	1916.	1915.
	Value			
	£	£	£	£
Herrings . . . . .	124,425	57,157	481,308	158,721
Sprats . . . . .	—	—	143	864
Sparlings . . . . .	—	2	251	346
Mackerel . . . . .	2,822	2,355	6,025	2,872
Cod and Codling . . . . .	40,427	35,242	296,662	249,019
Ling . . . . .	3,505	6,047	15,560	39,003
Torsk (Tusk) . . . . .	261	791	1,034	5,460
Saith (Coal Fish) . . . . .	6,230	3,519	24,684	31,902
Haddocks . . . . .	60,870	49,626	332,938	245,449
Whittings . . . . .	10,415	8,530	45,717	35,888
Conger Eels . . . . .	433	621	4,254	4,962
Gurnards . . . . .	226	94	1,131	570
Catfish . . . . .	1,631	1,806	6,625	8,760
Monks (Anglers) . . . . .	460	310	2,693	2,507
Hake . . . . .	72	348	3,776	6,186
Squids . . . . .	—	—	2	12
Turbot . . . . .	481	240	4,936	4,353
Halibut . . . . .	5,098	6,305	17,004	30,405
Lemon Soles . . . . .	7,398	6,987	34,873	42,330
Flounders . . . . .	420	396	2,505	2,101
Plaice . . . . .	6,344	3,157	41,501	30,261
Brill . . . . .	9	14	36	122
Dabs . . . . .	1,041	495	3,865	2,394
Witches . . . . .	1,073	105	6,743	2,936
Megrims . . . . .	322	1,137	1,715	15,634
Skates and Rays . . . . .	3,289	4,536	15,706	28,699
Unclassified kinds . . . . .	196	65	1,410	535
<b>Totals</b>	<b>277,448</b>	<b>189,885</b>	<b>1,353,097</b>	<b>952,341</b>
<b>Shell Fish:—</b>	<b>£</b>	<b>£</b>	<b>£</b>	<b>£</b>
Crabs . . . . .	2,104	2,018	8,403	6,849
Lobsters . . . . .	2,523	2,746	10,396	11,961
Oysters . . . . .	17	62	774	986
Clams . . . . .	67	115	577	307
Mussels . . . . .	643	797	3,612	3,854
Unclassified . . . . .	1,549	1,142	5,562	5,261
<b>Total Value</b>	<b>6,908</b>	<b>6,880</b>	<b>29,324</b>	<b>29,718</b>
<b>Total Value of all Fish</b>	<b>284,356</b>	<b>196,765</b>	<b>1,382,421</b>	<b>982,059</b>

NOTE.—Landed by Foreign Vessels during the Six Months ended 30th June, 1916 (not included above), nil.

The above figures are subject to correction in the Board's Annual Report.



STATEMENT of the TOTAL QUANTITY and VALUE of the FISH returned as landed on the IRISH COASTS during the Month and Six Months ended 30th June, 1916, compared with the corresponding periods of the Year 1915.

Kinds of Fish.	June		Six Months ended 30th June.	
	1916.	1915.	1916.	1915.
QUANTITY.				
	Cwt.	Cwt.	Cwt.	Cwt.
Brill. . . . .	15	26	140	133
Soles. . . . .	214	144	760	606
Turbot. . . . .	25	34	161	157
Total Prime Fish. . . . .	254	204	1,061	896
Cod. . . . .	599	291	9,881	8,694
Conger Eel. . . . .	269	282	1,052	1,310
Haddock. . . . .	56	69	920	1,166
Hake. . . . .	1,219	846	2,100	1,567
Herrings. . . . .	35,473	28,062	95,842	96,741
Ling. . . . .	80	236	473	1,118
Mackerel. . . . .	33,369	18,778	115,802	67,654
Plaice. . . . .	891	719	3,985	3,849
Ray or Skate. . . . .	608	611	2,972	3,863
Sprats. . . . .	—	—	583	38
Whiting. . . . .	433	167	6,859	3,350
All other except Shell Fish. . . . .	1,208	1,058	4,505	4,865
Total. . . . .	74,459	51,323	245,535	195,111
Shell Fish :—	No.	No.	No.	No.
Crabs. . . . .	15,438	27,049	18,173	35,626
Lobsters. . . . .	29,973	48,872	42,270	72,686
Mussels. . . . .	Cwt.	Cwt.	Cwt.	Cwt.
Oysters. . . . .	20	40	4,046	2,837
Other Shell Fish. . . . .	No.	No.	No.	No.
	—	—	76,194	78,492
	Cwt.	Cwt.	Cwt.	Cwt.
	401	605	5,740	5,891
VALUE				
	£	£	£	£
Brill. . . . .	67	36	579	337
Soles. . . . .	1,127	647	4,339	3,021
Turbot. . . . .	137	136	892	680
Total Prime Fish. . . . .	1,331	819	5,810	4,038
Cod. . . . .	1,100	377	14,246	8,401
Conger Eel. . . . .	248	178	1,032	936
Haddock. . . . .	52	84	1,033	1,160
Hake. . . . .	2,396	1,287	4,369	2,500
Herrings. . . . .	24,806	20,514	75,620	49,257
Ling. . . . .	71	120	497	821
Mackerel. . . . .	12,407	9,001	61,153	29,931
Plaice. . . . .	1,322	903	6,324	5,369
Ray or Skate. . . . .	352	246	1,910	1,582
Sprats. . . . .	—	—	184	10
Whiting. . . . .	601	221	9,397	3,519
All other except Shell Fish. . . . .	1,031	696	4,294	3,191
Total. . . . .	45,717	34,446	185,869	110,715
Shell Fish :—				
Crabs. . . . .	98	134	124	202
Lobsters. . . . .	1,086	1,486	1,602	2,403
Mussels. . . . .	3	4	587	390
Oysters. . . . .	—	—	150	158
Other Shell Fish. . . . .	110	134	1,654	1,463
Total. . . . .	1,277	1,758	4,117	4,618
Total Value of Fish landed. . . . .	46,994	36,204	189,986	115,331

NOTE.—The above figures are subject to correction in Annual Returns

## EMIGRATION FROM IRELAND.

TABLE showing, by Destinations, the Numbers of Emigrants (Natives of Ireland) who left the Ports of Ireland during the Months of April, May and June, 1916, and the total for the Six Months ended the 30th June, 1916, together with the total Number of Emigrants in each of the corresponding periods of the year, 1915.

DESTINATION.	April, 1916.	May, 1916.	June, 1916.	Six Months ended 30th June, 1916.
<b>FOREIGN COUNTRIES AND THE COLONIES :—</b>				
America (U.S.), . . . . .	198	322	688	1,342
Canada, . . . . .	50	20	57	214
South Africa, . . . . .	—	—	1	4
Australia, . . . . .	2	—	17	44
New Zealand, . . . . .	—	—	4	9
Other Countries, . . . . .	1	1	—	6
<b>Total, . . . . .</b>	<b>251</b>	<b>343</b>	<b>767</b>	<b>1,619</b>
<b>GREAT BRITAIN :—</b>				
England and Wales, . . . . .	153	100	126	1,045
Scotland, . . . . .	78	48	34	409
<b>Total, . . . . .</b>	<b>231</b>	<b>148</b>	<b>160</b>	<b>1,454</b>
<b>General Total, 1916,</b>	<b>482</b>	<b>491</b>	<b>927</b>	<b>3,073</b>
<b>General Total, 1915,</b>	<b>824</b>	<b>1,025</b>	<b>1,123</b>	<b>4,061</b>

The figures in the above Table have been abstracted from the monthly Return published by the Registrar-General for Ireland.

*The figures are subject to revision in the Annual Report.*

MONTHLY AND QUARTERLY AVERAGE PRICES FOR IRELAND OF CROPS, LIVE STOCK, MEAT, PROVISIONS, &c., for the period ended 30th June, 1916.

PRODUCT.	MONTH.			QUARTER.	
	April	May	June	1916.	1915.
<b>CROPS :</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Wheat, . . . per 112 lbs.	13 2	13 10	12 10	13 4	—
Oats (White), ..	11 1	11 7	11 9	11 5	10 8
„ (Black), ..	9 10	11 10	11 9	11 2	10 4
Barley, ..	13 7	17 6	—	14 2	—
Potatoes, ..	3 11 $\frac{3}{4}$	4 11 $\frac{3}{4}$	5 10 $\frac{3}{4}$	4 10 $\frac{1}{2}$	4 3 $\frac{1}{2}$
Hay (Clover), ..	6 0 $\frac{1}{2}$	5 8 $\frac{1}{2}$	6 1 $\frac{1}{2}$	5 11 $\frac{1}{2}$	5 0 $\frac{1}{2}$
„ (Meadow), ..	4 3	4 0	3 9 $\frac{1}{2}$	4 0 $\frac{1}{2}$	4 0
Grass Seed—					
(Perennial Rye), ..	14 1	14 0	—	14 1	—
(Italian Rye), ..	—	—	—	—	—
Flax, .. per 14 lbs.	22 0	24 3	22 10	22 5	—
<b>LIVE STOCK :</b>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>
Calves (young), per head	3 13 0	3 19 9	4 10 3	4 1 6	3 3 0
<b>Store Cattle—</b>					
Over 6 and not exceeding 12 months, per head	8 6 3	8 18 3	8 18 9	8 13 0	7 5 3
One year old and under two years, per head	12 11 6	12 12 0	12 18 0	12 13 9	10 6 0
Two years old and under three years, per head	17 1 3	17 5 0	17 15 9	17 7 0	13 12 3
Three years old and over, per head	20 14 9	20 6 0	21 14 6	20 16 9	15 18 3
<b>Fat Cattle—</b>					
Two years old and under three years, per head	21 9 6	22 13 6	22 17 0	22 5 3	17 18 3
Three years old and over, per head	25 3 0	26 15 6	26 17 0	26 4 0	21 6 9
Cows and Bulls, ..	20 6 0	21 12 3	22 7 9	21 7 9	17 8 0
<b>Springers—</b>					
Cows and Heifers, ..	20 19 6	21 11 9	21 17 3	21 8 3	17 11 6
Milch Cows (down calved), per head	19 0 9	19 16 9	20 2 0	19 12 0	16 1 9
Lambs (under 12 months old), .. per head	1 12 9	1 16 6	2 1 3	2 0 9	1 12 9
<b>Store Sheep—</b>					
One year old and under two years, per head	2 16 9	2 14 0	2 17 9	2 16 0	2 10 3
Two years old and over, per head	—	2 13 9	2 7 6	2 9 9	2 5 0
<b>Fat Sheep—</b>					
One year old and under two years, per head	3 6 0	3 9 9	3 6 9	3 7 0	2 18 3
Two years old and over, per head	3 15 3	3 12 9	3 11 9	3 13 3	3 3 3
<b>Young Pigs—</b>					
8 to 10 weeks old, per head	1 16 6	2 0 6	1 19 9	1 19 0	1 10 6
<b>Store Pigs—</b>					
10 weeks to 4 months old, per head	2 6 9	2 5 9	2 4 9	2 5 6	1 18 6
4 months old and over, ..	2 16 3	2 15 9	2 17 9	2 16 9	2 9 3
<b>Fat Pigs, ..</b>	<i>6 6 9</i>	<i>7 1 3</i>	<i>7 0 0</i>	<i>6 19 0</i>	<i>5 9 0</i>
<b>Sows, ..</b>	<i>10 2 0</i>	<i>12 8 3</i>	<i>10 16 0</i>	<i>11 2 0</i>	<i>7 5 0</i>
<b>MEAT, PROVISIONS, &amp;c.</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Beef (Live), per 112 lbs.	56 0	63 3	64 6	62 0	52 3
„ (Dead), ..	98 0	110 9	113 0	108 6	91 6
Mutton (Live), ..	59 3	61 9	58 9	59 6	52 0
„ (Dead), ..	103 9	108 0	102 9	104 3	91 0
Pork (Dead), ..	89 3	89 0	87 3	88 3	75 0
Butter (Creamery), ..	155 3	157 3	155 6	156 0	133 6
„ (Farmers), ..	148 0	145 0	137 6	141 6	120 9
Eggs, .. per 120	11 9	12 2	13 8	12 7	10 7
Wool, .. per lb.	1 7 $\frac{1}{2}$	1 7	1 5 $\frac{1}{2}$	1 6 $\frac{1}{2}$	1 6 $\frac{1}{2}$

QUARTERLY AVERAGE PRICES FOR EACH PROVINCE, OF CROPS, LIVE STOCK,  
MEAT, PROVISIONS, &c., for the Quarter ended 30th June, 1916.

PRODUCT.	PROVINCE.			
	Leinster.	Munster.	Ulster.	Connaught.
<b>CROPS :</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Wheat, .. per 112 lbs.	13 4	—	—	—
Oats (White), .. "	11 11	11 4	10 11	12 0
" (Black), .. "	11 4	10 7	—	—
Barley, .. "	13 5	—	—	16 6
Potatoes, .. "	5 8½	4 2½	4 8	3 8
Hay (Clover), .. "	7 0½	4 11½	5 11	4 3½
" (Meadow), .. "	3 10½	3 4½	4 8½	3 5½
Grass Seed—				
(Perennial Rye), .. "	—	—	14 1	—
(Italian Rye), .. "	—	—	—	—
Flax, .. per 14 lbs.	—	—	22 5	—
<b>LIVE STOCK :</b>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>
Calves (young) .. per head	4 1 6	3 10 9	3 11 6	5 4 9
Store Cattle—				
Over 6 and not exceeding 12 months, .. per head	8 19 6	8 12 3	8 15 3	8 0 6
One year old and under two years, .. per head	13 13 0	12 5 0	12 13 6	12 3 3
Two years old and under three years, per head	18 18 3	17 1 6	15 14 3	17 10 6
Three years old and over, per head	22 18 6	20 2 6	19 16 3	21 1 3
Fat Cattle—				
Two years old and under three years, per head	23 4 0	22 5 0	21 11 3	21 10 3
Three years old and over, per head	25 15 6	26 8 9	23 11 9	30 10 0
Cows and Bulls, .. "	23 12 3	21 2 0	20 7 9	24 6 3
Springers—				
Cows and Heifers, per head	22 2 9	19 15 3	20 16 3	23 8 6
Milch Cows (down calved), .. "	20 3 6	19 1 0	19 8 3	19 7 0
Lambs (under 12 months old) per head	1 19 6	2 2 0	2 0 0	2 3 3
Store Sheep—				
One year old and under two years, .. per head	2 11 6	2 15 3	2 13 6	2 19 3
Two years old and over, per head	2 9 9	—	—	3 0 6
Fat Sheep—				
One year old and under two years, per head	3 3 3	3 10 0	3 13 0	3 8 9
Two years old and over, .. "	3 11 6	3 13 3	3 16 9	3 19 3
Young Pigs—				
8 to 10 weeks old per head	1 11 3	—	2 2 3	2 8 3
Store Pigs—				
10 weeks to 4 months old, per head	2 10 9	1 19 3	2 12 0	—
4 months old and over, .. "	3 4 6	2 15 9	—	—
Fat Pigs, .. "	7 7 9	6 9 6	—	7 10 0
Sows, .. "	11 18 9	13 0 6	9 9 9	—
<b>MEAT, PROVISIONS, &amp;c.</b>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Beef (Live), .. per 112 lbs.	62 0	—	—	—
" (Dead), .. "	108 6	—	—	—
Mutton (Live), .. "	59 6	—	—	—
" (Dead), .. "	104 3	—	—	—
Pork (Dead), .. "	89 9	83 0	87 9	88 0
Butter (Creamery), .. "	154 3	156 3	—	—
" (Farmers), .. "	124 0	133 3	152 0	124 3
Eggs, .. per 120	13 3	11 8	12 11	12 5
Wool, .. per lb.	1 7½	1 6½	—	1 6½

NUMBER OF ANIMALS included in Returns furnished under the MARKETS and FAIRS (Weighing of Cattle) Act, 1891, Sections 3 and 4,  
during the Quarter ended 30th June, 1916.

WEEK ENDED	FAT CATTLE.					FAT SHEEP.			
	Dublin.		Belfast.		Total Number of Cattle included in Returns.	Dublin.		Belfast.	Total Number of Sheep included in Returns.
	Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.	Corporation Market Authorities.	Mr. John Robson, Auctioneer.		Corporation Market Authorities.	Mr. Gavin Low, Auctioneer.	Corporation Market Authorities.	
1916.									
April	48	79	27	67	221	—	257	—	257
"	42	107	27	59	235	—	147	—	147
"	53	133	27	71	284	—	198	—	198
May	—	—	28	59	87	—	—	—	—
"	—	—	27	46	73	—	—	—	—
"	45	74	27	55	201	—	—	—	—
"	54	153	27	56	290	—	251	—	251
"	57	95	27	39	218	—	282	—	282
June	69	87	28	51	235	—	203	—	203
"	56	112	27	31	226	—	409	—	409
"	64	113	25	43	246	—	534	—	534
"	59	101	26	37	223	—	436	—	436
"	61	109	26	37	233	—	322	—	322
Totals,	608	1,163	349	651	2,771	—	3,504	—	3,504

WEEKLY AVERAGE PRICES of WHEAT, OATS, and BARLEY, per 112 lbs., computed from Market Returns of certain quantities of these Cereals supplied by Official Reporters of Prices, during the QUARTER ended 30th June, 1916.

Returns received in the Week ended	WHEAT.		OATS.		BARLEY.	
	Average Price per 112 lbs.	Quantity.	Average Price per 112 lbs.	Quantity.	Average Price per 112 lbs.	Quantity.
1916.	<i>s. d.</i>	Cwts. of 112 lbs.	<i>s. d.</i>	Cwts. of 112 lbs.	<i>s. d.</i>	Cwts. of 112 lbs.
April 8	13 3	380	10 6	10,438	13 10	340
" 15	13 7	300	10 10	11,205	—	—
" 22	12 6	300	10 11	11,419	13 4	980
" 29	—	—	11 4	4,609	14 11	150
May 6	—	—	11 2	3,259	16 8	80
" 13	14 3	250	11 4	8,311	17 4	60
" 20	13 9	500	11 11	5,819	18 0	75
" 27	13 9	430	12 0	7,079	18 0	32
June 3	12 4	150	11 10	6,962	—	—
" 10	14 6	80	11 6	5,809	—	—
" 17	12 9	300	11 8	5,171	—	—
" 24	12 10	130	11 11	4,828	—	—
July 1	12 10	130	11 8	4,208	—	—

QUARTERLY AVERAGE PRICES of FAT CATTLE and FAT SHEEP, per 112 lbs., LIVE WEIGHT, sold in DUBLIN MARKETS during the period ended 30th June, 1916, and also for the corresponding period during nineteen preceding years.

Year.	Fat Cattle.	Fat Sheep.	Year.
	<i>£ s. d.</i>	<i>£ s. d.</i>	
1916,	3 2 0	2 19 6	1916.
1915,	2 12 3	2 12 0	1915.
1914,	1 15 6	2 1 0	1914.
1913,	1 19 2	2 4 1	1913.
1912,	1 19 1	1 19 5	1912.
1911,	1 15 5	1 16 8	1911.
1910,	1 13 3	2 1 10	1910.
1909,	1 14 9	1 14 4	1909.
1908,	1 14 10	2 2 3	1908.
1907,	1 14 0	2 2 8	1907.
1906,	1 12 6	2 2 10	1906.
1905,	1 12 9	1 19 10	1905.
1904,	1 14 4	2 0 7	1904.
1903,	1 14 5	2 0 4	1903.
1902,	1 17 4	1 17 0	1902.
1901,	1 13 4	1 18 0	1901.
1900,	1 14 11	2 0 1	1900.
1899,	1 13 7	1 16 4	1899.
1898,	1 10 7	1 14 9	1898.
1897,	1 13 3	1 17 11	1897.

## BUTTER PRICES DURING THE QUARTER

ABSTRACTED FROM "THE GROCER," "GROCER'S REVIEW."

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the  
 an Irish Creamery would be 5s. to 7s. per cwt. less than  
 freight, commission,

COUNTRY OF ORIGIN.	Type of Package.	Place of Sale.	WEEK ENDED			
			APRIL.			
			1st.	8th.	15th.	22nd.
IRELAND— Creamery Butter.	Kiebs, kegs, or pyramid boxes	London, . . .	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.
		Liverpool, . . .	—	—	156	—
		Bristol, . . .	—	160-162	162-164	166
		Cardiff, . . .	156-160	160-166	164-167	169-170
		Manchester, . . .	—	164	156-166	166-166
		Birmingham, . . .	—	—	162-164	162-164
		Glasgow, . . .	—	—	164	164
		Limerick, . . .	—	—	—	—
		Cork, . . .	—	—	—	—
		Belfast, . . .	—	—	—	—
	1lb. rolls, in boxes, Salted or Unsalted.	Dublin, . . .	154-158/8	154-156/4	154-158/8	158/8-163/4
		F.O.R., . . .	172/8	172/8	172/8	163/4-172/8
Factories,		London, . . .	—	—	—	—
		Liverpool, . . .	124	124	124	124
		Bristol, . . .	130	130	130	130
		Cardiff, . . .	125-130	120-130	130	125-135
	Firkins 1st Export Price	Manchester, . . .	—	—	—	—
		Cork, . . .	146	146-147	146	144-146
Farmers' Butter.	Do. 2nd "	Cork, . . .	122	112-120	116-125	121-124
	Do. 3rd "	Cork, . . .	90	95	95	—
	Fresh, . . .	Cork, . . .	126-127	126-132	131-141	141-147
FRANCE.	12x2lb. rolls,	London, . . .	Per doz. lbs. 14/6-18/6	Per doz. lbs. 14/6-18/6	Per doz. lbs. 14/6-18/6	Per doz. lbs. 14/6-18/6
	Paris baskets.	do., . . .	Per cwt. 153-160	Per cwt. 153-160	Per cwt. 153-160	Per cwt. 153-160
DENMARK AND SWEDEN	Kiebs, . . .	Copenhagen Quotation.	Kr. } per 50 } =per Kilos) cwt.	Kr. } per 50 } =per Kilos) cwt.	Kr. } per 50 } =per Kilos) cwt.	Kr. } per 50 } =per Kilos) cwt.
		Average over- price.	—	—	—	—
		London, . . .	170-174	174-176	174-176	172-174
		Liverpool, . . .	168-174	168-177	170-178	172-175
		Bristol, . . .	—	—	—	—
		Cardiff, . . .	175-178	178	180-184	184
		Manchester, . . .	170-174	169-174	171-177	171-176
		Birmingham, . . .	173-175	171-173	173-175	173-176
		Newcastle-on- Tyne, . . .	164-170	166-172	170-174	168-170
		Glasgow, . . .	176-178	172-174	175-176	172-173
	1lb. rolls, 10x24 lb. boxes.	Leith, . . .	—	172	174	174
		Hull, . . .	173-176	169-174	173-175	168-174
FINLAND	Kiebs, . . .	F.O.R. Lon- don	—	—	—	—
		Manchester, . . .	148-152	—	154-166	—
		Liverpool, . . .	—	—	—	—
		Hull, . . .	—	—	—	—
		Cardiff, . . .	150	149	147	148

ENDED 30TH JUNE, 1916.

## "GROCER'S GAZETTE," AND OTHER TRADE REPORTS.

Landed Prices of the Choicest Qualities. The Nett F.O.R. Price to the Landed Prices in Great Britain. This figure covers handling, &c.

WEEK ENDED								
MAY.					JUNE.			
29th.	6th.	13th.	20th.	27th.	3rd.	10th.	17th.	24th.
Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.
162-166	160-164	160-168	162-163	162-168	160-166	158-164	158-164	158-164
164-170	162-164	157-163	160-165	164-168	162-168	158-168	158-168	158-168
168-170	164-172	164-169	164-170	166-171	164-168	164-168	162-166	162-166
156-166	164-171	162-169	164-176	163-172	164-172	164-169	164-170	—
163-164	160-168	163-169	164-170	165-170	165-172	162-171	166-168	162-170
162-164	163-165	164-168	164-168	164-168	166-168	164-166	162-164	163-165
—	—	—	166-168	165-168	164-166	162-164	160-162	160-162
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
163/4-172/8	163/4-168	158/8-163/4	163/4	163/8	161-165/8	161-163/4	158/8-161	158/8-161
—	—	163/4-168	168-172/8	163-172/8	168-172/8	168-172/8	168-172/8	168-172/8
—	—	128-146	135-160	140-157	140-153	136-152	139-160	142-160
124	124	130	130-145	130-145	134-150	134-150	134-150	145-155
130	130	130	130	130	140	140	140	140
125-135	125-130	130-135	140-146	140-150	146-150	146-150	145-150	—
133-144	133	133-140	141-146	141-142	140-141	140-141	140-142	142-144
121-130	121-125	125-134	134-140	132-138	136-138	135-138	135-139	135-138
113-115	114	118-121	121	123	123-124	124-127	127	127
134-147	134-135	140-151	151	144-151	143-145	142-144	142-147	144-148
Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
14/6-18/6	14/6-17/6	14/6-17/6	14/6-17/6	14/6-17/6	14/6-17/6	14/6-17/6	14/6-17/6	14/6-17/6
Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
153-160	143-155	146-155	146-153	146-155	146-155	146-155	146-155	146-155
Kr. } per 50 cwt.	Kr. } per 50 cwt.	Kr. } per 50 cwt.	Kr. } per 50 cwt.	Kr. } per 50 cwt.	Kr. } per 50 cwt.	Kr. } per 50 cwt.	Kr. } per 50 cwt.	Kr. } per 50 cwt.
168-170	168-172	170-174	170-174	170-174	172-172	174-176	174-176	174-178
165-173	165-172	166-175	168-174	170-175	170-176	168-176	168-178	172-178
182	184	182	184	180	182	180	180-184	—
167-173	168-173	170-175	170-175	170-175	170-176	171-178	173-177	172-178
168-171	168-171	171-173	171-173	170-173	171-173	172-174	173-175	175-176
165-168	164-170	167-173	169-172	170-172	170-174	170-173	170-173	169-172
170-171	168-170	171-173	173-175	171-173	170-172	173-176	174-176	174-176
169-171	167-168	170	170	172	173	172-173	175-176	174
168-172	168-170	168-172	—	170-173	169-172	170-173	170-172	170-173
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
148	—	148	148	148	148	—	—	—

[Continued on pages 692 and 693]



# BUTTER PRICES DURING THE QUARTER

## ABSTRACTED FROM "THE GROCER," "GROCER'S REVIEW,"

Excepting 1-lb. Rolls and Farmers' Butter all quotations are the  
an Irish Creamery would be 5s. to 7s. per cwt. less than  
freight, commission,

COUNTRY OF ORIGIN.	Type of Package.	Place of Sale.	WEEK ENDED.			
			APRIL.			
			1st.	8th.	15th.	22nd.
RUSSIA AND SIBERIA.	Kiebs.	London.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.	Per cwt. s. s.
		Liverpool.	126-134	126-134	126-134	128-136
		Bristol.	120-136	120-136	120-136	120-136
		Cardiff.	130-140	130-140	130-140	130-140
		Manchester.	120-130	120-130	128	125-130
		Birmingham.	130-132	130-132	132	132
		Glasgow.	124-136	124-136	128-136	128-136
		Leith.	120-130	120-130	—	—
		Hull.	120-130	118-130	118-130	118-130
HOLLAND.	Boxes.	London.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
	Rolls.	do.	—	—	—	—
	Boxes.	Glasgow.—	Per cwt.	Per cwt.	Per cwt.	Per cwt.
		Fresh.	—	—	—	—
		Salt.	—	—	—	—
		Manchester.	—	—	—	—
		Hull.	—	—	—	—
ITALY.	Rolls.	London.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.	Per doz. lbs.
CANADA.	56 lb. Boxes.	London.	Per cwt.	Per cwt.	Per cwt.	Per cwt.
		Liverpool.	—	—	—	—
		Bristol.	—	—	—	—
		Cardiff.	156	—	—	—
		Birmingham.	—	—	—	—
		Manchester.	—	—	—	—
		Glasgow.	—	—	—	—
AUSTRALIA AND NEW ZEALAND.*	Boxes.	London.	A.s. — u. —	A.s. 158-160 u. 158-162	A.s. 158-160 u. 158-160	A.s. 156-158 u. 156-160
		Liverpool.	Z. 162-164 A. 153-158	Z. 162-164 A. 152-160	Z. 162-164 A. 152-161	Z. 162-164 A. 152-160
		Bristol.	Z. 164-167 A. 156-162	Z. 164-168 A. 156-162	Z. 165-168 A. 156-162	Z. 165-168 A. 156-162
		Cardiff.	Z. 164-172 A. 160-162	Z. 164-172 A. 164	Z. 164-170 A. 166	Z. 164-170 A. 162-164
		Manchester.	Z. 160-170 A. —	Z. 166-172 A. —	Z. 166-171 A. 160-164	Z. 163-170 A. 158-162
		Birmingham.	Z. 164-168 A. 160-162	Z. 165-169 A. 160-162	Z. 165-170 A. 162-164	Z. 165-169 A. —
		Glasgow.	Z. 166-167 A. 164-165	Z. 166-168 A. 164-165	Z. 167-168 A. 164-165	Z. 167-168 A. 164-165
		Leith.	Z. 166-167 A. —	Z. 168-170 A. —	Z. 168-170 A. —	Z. 168-170 A. —
		Hull.	A. 156-160 Z. 163	A. 158-160 Z. 167-169	A. 158-162 Z. 167-169	A. 160 Z. 163
		London.	154-160	154-168	154-168	152-158
		Liverpool.	155-158	155-160	158-160	158-160
		Bristol.	—	—	—	—
		Cardiff.	—	—	—	—
		Manchester.	—	—	—	—
		Birmingham.	—	—	—	—
		Glasgow.	—	—	—	—
ARGENTINA.	Boxes.	London.	154-160	154-168	154-168	152-158
		Liverpool.	155-158	155-160	158-160	158-160
		Bristol.	—	—	—	—
		Cardiff.	—	—	—	—
		Manchester.	—	—	—	—
		Birmingham.	—	—	—	—
		Glasgow.	—	—	—	—
UNITED STATES.	Tubs and boxes.	London.	—	—	—	—
		Liverpool.	—	—	—	—
		Bristol.	130-140	130-140	—	—
		Cardiff.	—	139-150	148-154	146-150
		Manchester.	—	—	—	—

\* A.—Australia.

Z.—New Zealand.

s.—salted.

u.—unsalted.



**AVERAGE RETAIL PRICES OF AGRICULTURAL SEEDS IN 42 IRISH TOWNS ON THE 1ST OF EACH OF THE MONTHS MAY AND JUNE, 1916.**

CORN CROPS.										ROOTS AND GREEN CROPS.									
Wheat.		Oats.		Barley.		Rye.		Turnips.		Mangolds.		Carrots.		Parsnips.		Rape.		Vetches.	
Irish Grown.	Im-ported.	Irish Grown.	Im-ported.	Irish Grown.	Im-ported.	Irish Grown.	Im-ported.	Swede.	Aber-deen.	Per lb.	s.	d.	Per lb.	s.	d.	Per lb.	s.	d.	Per st.
Per cwt.	s. d.	Per cwt.	s. d.	Per cwt.	s. d.	Per cwt.	s. d.	Per lb.	s. d.	Per lb.	s.	d.	Per lb.	s.	d.	Per lb.	s.	d.	Per st.
16 0	20 0	11 8	15 11	15 8	19 2	17 6	13 4	1 9	1 5	1 1	1 1	4 7	1 1	2 4	0 8	3 5	3 5	3 5	3 5
—	—	13 8	16 10	16 6	19 6	—	—	1 9	1 9	1 1	1 2	2 9	1 1	2 3	0 9	3 5	3 5	3 5	3 5
—	—	11 9	14 0	—	—	—	—	1 10	1 2	1 1	1 1	5 2	1 1	2 3	0 8	3 5	3 5	3 5	3 5
—	—	12 2	15 2	20 0	23 0	12 3	—	1 10	1 2	1 1	1 1	—	1 1	2 3	0 8	3 5	3 5	3 5	3 5
—	—	12 4	15 8	17 3	19 10	14 7	—	1 10	1 2	1 1	1 1	3 2	1 1	2 2	0 10	3 1	3 1	3 1	3 1
16 0	20 0	—	—	—	—	—	—	1 10	1 2	1 1	1 1	2 9	1 0	2 1	0 10	3 5	3 5	3 5	3 5
—	—	—	—	—	—	—	—	1 10	1 3	1 1	1 1	2 8	1 1	2 2	0 9	3 5	3 5	3 5	3 5

**AVERAGE RETAIL PRICES OF AGRICULTURAL SEEDS—continued.**

GRASS SEEDS.										CLOVER SEEDS.				FLAX SEED.			
Perennial.					Italian.					Red.	White.	Alsike.	Dutch.	Russian.			
28 lbs.	26 lbs.	24 lbs.	22 lbs.	18 lbs.	Per bushel.	s. d.	Per bushel.	s. d.	Per lb.	s. d.	Per lb.	s. d.	Per bag.	£ s. d.			
Per bushel.	Per bushel.	Per bushel.	Per bushel.	Per bushel.	Per bushel.	s. d.	Per bushel.	s. d.	Per lb.	s. d.	Per lb.	s. d.	Per bag.	£ s. d.			
7 1	6 8	6 2	7 9	6 8	7 3	6 8	7 3	6 8	1 2	1 2	2 2	2 2	1 3	—			
7 0	6 6	6 2	7 8	6 2	7 0	5 9	7 1	5 9	1 2	1 2	2 2	2 2	1 3	—			
7 2	6 7	6 0	7 8	6 0	7 1	6 10	7 4	6 10	1 2	1 2	2 2	2 2	1 2	—			
7 0	6 6	5 11	7 4	5 11	6 8	5 9	6 1	5 9	1 2	1 2	2 2	2 2	1 2	—			
5 11	5 6	5 1	6 11	5 1	6 1	5 7	6 1	5 7	1 1	1 1	2 2	2 2	1 3	—			
6 1	5 8	5 4	6 8	5 4	6 2	5 8	6 7	5 8	1 2	1 2	2 2	2 2	1 3	—			
6 1	5 8	6 1	7 2	6 1	6 7	6 11	7 2	6 11	1 1	1 1	2 2	2 2	1 3	—			
6 11	6 6	6 3	7 7	6 3	7 7	6 11	7 6	6 11	1 2	1 2	2 2	2 2	1 3	—			
6 11	6 4	5 11	7 4	5 11	6 8	5 9	7 4	6 8	1 2	1 2	2 2	2 2	1 2	—			

nster	1st May	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
	1st June	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
	1st June	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
nster	1st May	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
	1st June	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
	1st June	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
ter	1st May	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
	1st June	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
	1st June	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
maught	1st May	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
	1st June	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
	1st June	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
HAND	1st May	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
	1st June	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11
	1st June	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11

*Statistics and Intelligence Branch.*

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND, UPPER MERRION STREET, DUBLIN.

AVERAGE RETAIL PRICES PER CWT. OF FERTILISERS IN 42 IRISH TOWNS ON THE 1ST OF EACH OF THE MONTHS  
MAY AND JUNE, 1916.

	Nitrate of Soda.	Sulphate of Ammonia.	Superphosphate.				Pure Dissolved Bones.	Basic Slag.		Agricultural Salt.	
			Soluble Phosphate.					Soluble Phosphate.			
			35%		30%			28%			
			s.	d.	s.	d.		s.	d.		
Leinster	1st May	s. 20	d. 7	s. 5	d. 3	s. 4	d. 5	s. 7	d. 7	s. 2	d. 8
	1st June	20 1	4 4	4 4	6 6	4 4	6 6	4 4	6 6	2 3	7 7
Munster	1st May	20 2	20 6	4 4	11 11	4 4	6 6	7 7	8 8	4 4	7 7
	1st June	20 2	20 5	4 4	11 11	4 4	6 6	7 7	8 8	4 4	7 7
Ulster	1st May	18 11	19 3	4 4	8 8	4 4	6 6	7 7	6 6	4 4	9 9
	1st June	19 2	19 5	4 4	11 11	4 4	6 6	7 7	5 5	4 4	8 8
Connaught	1st May	21 0	20 6	5 5	1 1	4 4	9 9	8 8	6 6	4 4	11 11
	1st June	21 0	20 2	5 5	2 2	4 4	11 11	8 8	6 6	4 4	11 11
IRELAND	1st May	20 1	20 3	5 5	9 9	4 4	6 6	7 7	8 8	4 4	5 5
	1st June	20 1	20 2	5 5	4 4	11 11	7 7	8 8	6 6	4 4	5 5

*Statistics and Intelligence Branch,*

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND,  
UPPER MERION STREET, DUBLIN.

AVERAGE RETAIL PRICES PER CWT. OF FEEDING STUFFS IN 42 IRISH TOWNS ON THE 1ST OF EACH OF THE MONTHS MARCH, APRIL, MAY AND JUNE 1916.

CORN AND CORN OFFALS.										OILSEEDS AND THEIR PRODUCTS.									
Maize.				Bran.				Pollard or Sharps.				Linsced.				Cotton Seed.			
Whole Meal.				Red.		White.		Pollard or Sharps.		Midd- lings. Meal.		Whole Meal.		Cake.		Decorticated			
				Broad.		Broad.		Fine.		Coarse				Home made		Amer- ican.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.		s. d.		s. d.		s. d.		s. d.			
				s. d.		s. d.		s. d.											

RETURN of the NUMBER of HORSES EXPORTED from IRELAND through GREAT BRITAIN to the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 30TH JUNE, 1916, showing the Ports of Embarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast, . . . .	—	—	—	—
Cork, . . . .	—	—	—	—
Dublin, . . . .	1	3	5	9
Dundalk, . . . .	—	—	—	—
Greenore, . . . .	—	—	—	—
Waterford, . . . .	—	—	—	—
Wexford, . . . .	—	—	—	—
Total, . . . .	1	3	5	9

RETURN of the NUMBER of HORSES IMPORTED into IRELAND through GREAT BRITAIN from the COLONIES and FOREIGN COUNTRIES during the THREE MONTHS ended 30TH JUNE, 1916, showing the Ports of Debarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Belfast, . . . .	—	—	—	—
Dublin, . . . .	—	—	—	—
Total, . . . .	—	—	—	—

RETURN of the NUMBER of HORSES EXPORTED from IRELAND direct to FOREIGN COUNTRIES during the THREE MONTHS ended 30TH JUNE, 1916, showing the Ports of Embarkation in Ireland.

PORTS.	Number of Horses.			
	Stallions.	Mares.	Geldings.	Total.
Cork, . . . .	—	—	—	—
Limerick, . . . .	—	—	—	—
Total, . . . .	—	—	—	—

## TABLES SHOWING THE EXPORTS

## TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT  
the PORTS OF EMBARKATION

PORTS IN IRELAND.	CATTLE.							SHEEP.			
	Fat.	Stores (fatten- ing).	Milch Cows.	Spring- ers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ballina.	1	—	—	—	14	—	15	—	—	—	—
Belfast.	5,159	33,357	3,192	—	347	289	42,335	687	—	2,100	2,787
Cork.	3,318	16,600	591	—	—	54	20,563	3,071	3,987	7,321	14,379
Drogheda.	2,269	32	259	—	—	—	3,560	2,284	—	13,241	15,525
Dublin.	29,449	28,074	6,481	—	32	500	64,536	28,410	—	58,356	86,766
Dundalk.	6,120	4,746	111	—	2,106	—	13,083	2,122	—	11,412	13,534
Greenore.	652	2,838	1,309	—	—	—	4,647	95	—	734	829
Larne.	1,074	14,045	157	—	—	289	15,565	54	—	—	54
Limerick.	—	16	—	—	—	—	16	—	—	—	—
Londonderry.	6,877	17,657	345	—	201	2,733	27,863	478	1,240	2,459	4,177
Millford.	—	—	—	—	—	—	—	—	—	—	—
Mulroy.	—	—	—	—	—	—	—	—	—	—	—
Newry.	620	2,019	—	—	—	—	2,639	—	—	1,591	1,591
Portrush.	—	—	—	—	—	—	—	—	—	—	—
Sligo.	126	176	—	—	—	—	302	426	—	272	698
Waterford.	7,896	14,037	11	—	150	459	22,603	5,296	—	7,468	12,764
Westport.	—	—	—	—	—	—	—	—	—	—	—
<b>TOTAL.</b>	<b>64,561</b>	<b>133,495</b>	<b>12,456</b>	<b>—</b>	<b>2,850</b>	<b>4,365</b>	<b>217,727</b>	<b>42,923</b>	<b>5,227</b>	<b>104,954</b>	<b>153,104</b>

## TABLE

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to GREAT  
the PORTS OF DEBARKATION

PORTS IN GREAT BRITAIN.	CATTLE.							SHEEP.			
	Fat.	Stores (fatten- ing).	Milch Cows.	Spring- ers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ardrassan.	—	—	—	—	—	—	—	—	—	—	—
Ayr.	1,201	25,802	430	—	—	105	27,588	481	—	261	742
Bristol.	296	2,433	1	—	—	19	2,799	458	—	95	553
Fishguard.	1,604	16,529	430	—	—	406	19,019	2,547	3,987	5,132	11,666
Fleetwood.	93	119	219	—	—	—	431	—	—	672	672
Glasgow.	6,211	27,031	3,090	—	591	3,436	40,359	417	—	1,495	1,912
Greenock.	676	10,241	—	—	—	52	10,969	16	—	160	176
Heysham.	4,663	14,089	3,005	—	—	47	21,804	2,921	1,240	5,680	9,841
Holyhead.	12,340	12,076	3,741	—	—	60	28,717	9,112	—	19,704	28,816
Liverpool.	33,457	16,267	1,312	—	2,259	36	53,331	23,818	—	67,637	91,455
London.	—	—	—	—	—	—	—	—	—	—	—
Manchester.	1,772	—	—	—	—	—	1,772	3,041	—	4,118	7,159
Plymouth.	—	—	—	—	—	—	—	—	—	—	—
Preston.	—	—	—	—	—	—	—	—	—	—	—
St. Ith.	970	1,036	1	—	—	—	2,007	112	—	—	112
Southampton.	—	—	—	—	—	—	—	—	—	—	—
Stranraer.	778	7,322	127	—	—	204	8,931	—	—	—	—
<b>TOTAL.</b>	<b>64,561</b>	<b>133,495</b>	<b>12,456</b>	<b>—</b>	<b>2,850</b>	<b>4,365</b>	<b>217,727</b>	<b>42,923</b>	<b>5,227</b>	<b>104,954</b>	<b>153,104</b>

## AND IMPORTS OF ANIMALS.

## I.

BRITAIN during the Three Months ended 30TH JUNE, 1916, showing  
IN IRELAND.

SWINE.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN IRELAND.
Fat.	Stores.	Total.		Stal- lions.	Mares.	Geld- ings.	Total.				
22	—	22	—	—	—	—	—	—	—	37	Ballina.
470	2,831	3,301	2	1	117	267	385	—	5	48,815	Belfast.
5,992	—	5,992	1	—	13	26	39	—	18	40,992	Cork.
542	276	818	27	—	—	—	—	—	—	19,930	Dooneda.
20,795	—	20,795	18	46	236	217	499	1	—	172,665	Dublin.
3,087	823	3,910	740	—	8	7	15	—	2	31,284	Dundaik.
36	595	631	264	2	180	190	372	—	31	6,774	Greenore.
7	3,457	3,464	—	2	17	62	81	—	3	19,167	Larne.
—	—	—	—	—	—	—	—	—	—	16	Limerick.
744	—	744	—	—	14	29	43	—	1	32,828	Londonderry
—	—	—	—	—	—	—	—	—	—	—	Milford.
99	—	99	31	—	—	—	—	—	—	4,360	Mulroy.
—	—	—	—	—	—	—	—	—	—	—	Newry.
2,375	161	2,536	10	—	—	—	—	—	—	3,546	Portrush.
17,718	—	17,718	4	—	27	41	68	—	—	53,157	Sligo.
—	—	—	—	—	—	—	—	—	—	—	Waterford.
—	—	—	—	—	—	—	—	—	—	—	Westport
51,887	8,143	60,030	1,097	51	612	839	1,502	1	60	433,521	TOTAL.

## II.

BRITAIN during the Three Months ended 30TH JUNE, 1916, showing  
IN GREAT BRITAIN.

SWINE.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN GREAT BRITAIN.
Fat.	Stores.	Total.		Stal- lions.	Mares.	Geld- ings.	Total.				
—	—	—	—	—	39	106	145	—	—	145	Androssa.
409	3,815	4,224	1	1	10	3	14	—	—	32,569	Ayr.
718	—	718	—	—	—	3	3	—	—	4,073	Bristol.
17,096	—	17,096	3	—	33	51	84	—	16	47,834	Flintwood.
1,513	80	1,593	1	—	2	7	9	—	—	1,113	Flintwood.
—	—	—	—	—	43	136	179	—	5	44,049	Glasgow.
2,343	—	2,343	1	1	1	4	5	—	1	31,151	Greenock.
13,312	595	13,907	274	48	38	77	118	—	—	34,103	Haymarket.
13,253	1,260	14,513	814	—	369	321	738	1	31	75,464	Holyhead.
—	—	—	—	—	52	62	114	—	2	160,220	Liverpool.
243	—	243	3	—	—	—	—	—	—	2	London.
—	—	—	—	—	6	3	9	—	—	9,156	Manchester.
—	—	—	—	—	—	—	—	—	—	—	Plymouth.
—	—	—	—	—	—	—	—	—	—	—	Preston.
—	—	—	—	—	—	3	3	—	—	2,133	Sheff.
—	—	—	—	—	3	1	4	—	—	—	Sunderland.
—	2,393	2,393	—	1	16	62	79	—	3	11,406	Stranraer.
51,887	8,143	60,030	1,097	51	612	839	1,502	1	60	433,521	TOTAL.



TABLE

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from GREAT  
the PORTS OF

PORTS IN IRELAND.	CATTLE.							SHEEP.			
	Fat	Stores	Milch Cows.	Spring- ers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Ballina, . . .	—	—	—	—	2	—	2	160	—	—	160
Belfast, . . .	—	—	—	—	—	—	—	—	—	—	—
Coleraine, . . .	—	—	—	—	—	—	—	—	—	—	—
Cork, . . .	—	—	—	—	—	—	—	—	—	—	—
Drogheda, . . .	—	—	—	—	—	—	—	—	—	—	—
Dublin, . . .	—	42	—	—	—	1	43	—	3	—	3
Dundalk, . . .	—	1	—	—	—	—	1	—	—	—	—
Dundrum, . . .	—	—	—	—	—	—	—	—	—	—	—
Greenore, . . .	—	—	—	—	—	—	—	—	—	—	—
Larne, . . .	—	—	—	—	—	—	—	—	—	—	—
Limerick, . . .	—	—	—	—	—	—	—	—	—	—	—
Londonderry, . . .	—	16	—	—	—	2	18	—	—	—	—
Milford, . . .	—	—	—	—	—	—	—	—	—	—	—
Mulroy, . . .	—	—	—	—	—	—	—	—	—	—	—
Newry, . . .	—	—	—	—	—	—	—	—	—	—	—
Portrush, . . .	—	—	—	—	—	—	—	—	—	—	—
Rosslare, . . .	—	—	—	—	—	—	—	—	—	—	—
Sligo, . . .	—	—	—	—	—	—	—	—	—	—	—
Warrenpoint, . . .	—	—	—	—	—	—	—	—	—	—	—
Waterford, . . .	—	1	—	—	—	—	1	—	—	—	—
Westport, . . .	—	—	—	—	—	—	—	—	—	—	—
Wexford, . . .	—	—	—	—	—	—	—	—	—	—	—
TOTAL, . . .	—	60	—	—	2	3	65	160	3	—	163

TABLE

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from GREAT  
the PORTS OF EMBARKATION

PORTS IN GREAT BRITAIN.	CATTLE.							SHEEP.			
	Fat.	Stores	Milch Cows.	Spring- ers.	Other Cattle.	Calves.	Total.	Fat.	Stores.	Lambs.	Total.
Bossan, . . .	—	—	—	—	—	—	—	62	—	—	62
Stol, . . .	—	—	—	—	—	—	—	98	—	—	98
Guard, . . .	—	1	—	—	—	—	1	—	—	—	—
Wood, . . .	—	—	—	—	—	—	—	—	—	—	—
ow, . . .	—	25	—	—	—	2	27	—	—	—	—
ook, . . .	—	15	—	—	—	—	15	—	—	—	—
aham, . . .	—	1	—	—	—	—	1	—	—	—	—
yhead, . . .	—	12	—	—	—	1	13	—	3	—	3
erpool, . . .	—	6	—	—	2	—	8	—	—	—	—
don, . . .	—	—	—	—	—	—	—	—	—	—	—
chester, . . .	—	—	—	—	—	—	—	—	—	—	—
haven, . . .	—	—	—	—	—	—	—	—	—	—	—
mouth, . . .	—	—	—	—	—	—	—	—	—	—	—
son, . . .	—	—	—	—	—	—	—	—	—	—	—
th, . . .	—	—	—	—	—	—	—	—	—	—	—
hampton, . . .	—	—	—	—	—	—	—	—	—	—	—
mer, . . .	—	—	—	—	—	—	—	—	—	—	—
TOTAL, . . .	—	60	—	—	2	3	65	160	3	—	163

## III.

BRITAIN during the Three Months ended 30TH JUNE, 1916, showing  
DEBARKATION IN IRELAND.

PIGS.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN IRELAND.
Fat.	Stores.	Total.		Stal- lions.	Mares.	Geld- ings.	Total.				
—	—	—	—	8	17	13	38	—	—	200	Bellina.
—	—	—	—	—	—	—	—	—	—	—	Belfast.
—	9	9	—	—	27	21	48	—	1	58	Coleraine.
—	—	—	—	—	1	8	2	—	—	2	Cork.
—	5	5	1	149	192	87	428	—	—	480	Drogheda.
—	—	—	—	—	2	1	3	—	—	4	Dublin.
—	—	—	—	—	—	—	—	—	—	—	Dundalk.
—	—	—	—	—	—	—	—	—	—	—	Dundrum.
—	—	—	—	1	112	72	185	—	—	185	Greenore.
—	—	—	—	2	6	—	11	—	—	11	Larne.
—	—	—	—	—	—	—	—	—	—	—	Limerick.
—	—	—	—	2	9	2	13	—	—	31	Londonderry.
—	—	—	—	—	—	—	—	—	—	—	Millford.
—	—	—	—	—	—	—	—	—	—	—	Mulroy.
—	—	—	—	—	—	—	—	—	—	—	Newry.
—	—	—	—	—	—	—	—	—	—	—	Portrush.
—	—	—	—	—	—	—	—	—	—	—	Rosslare.
—	—	—	—	—	—	—	—	—	—	—	Sligo.
—	—	—	—	—	—	—	—	—	—	—	Warrenpoint.
—	—	—	—	2	37	42	81	—	—	82	Waterford.
—	—	—	—	—	—	—	—	—	—	—	Westport.
—	—	—	—	—	—	—	—	—	—	—	Wexford.
—	14	14	1	164	402	243	809	—	1	1,053	TOTAL.

## IV.

BRITAIN during the Three Months ended 30TH JUNE, 1916, showing  
IN GREAT BRITAIN.

PIGS.			Goats.	HORSES.				Mules or Jennets	Asses.	Total Animals	PORTS IN GREAT BRITAIN.
Fat.	Stores.	Total.		Stal- lions.	Mares.	Geld- ings.	Total.				
—	—	—	—	—	1	—	1	—	—	63	Androssan.
—	—	—	—	2	8	9	19	—	—	117	Ayr.
—	—	—	—	1	1	—	1	—	—	1	Bristol.
—	9	9	—	1	60	62	123	—	—	133	Edinburgh.
—	—	—	—	9	9	2	20	—	—	47	Fleetwood.
—	—	—	—	—	3	1	4	—	—	19	Glasgow.
—	—	—	—	3	1	2	6	—	—	7	Greenock.
—	3	3	1	146	300	151	597	—	—	617	Heysham.
—	—	—	—	1	13	11	25	—	—	83	Holyhead.
—	—	—	—	—	—	—	—	—	—	—	Liverpool.
—	—	—	—	—	—	—	—	—	—	—	London.
—	2	2	—	—	—	—	—	—	—	4	Manchester.
—	—	—	—	—	—	—	—	—	—	—	Newhaven.
—	—	—	—	—	—	—	—	—	—	1	Plymouth.
—	—	—	—	—	—	—	—	—	—	—	Portsmouth.
—	—	—	—	—	1	1	2	—	—	2	Sharncliffe.
—	—	—	—	—	—	—	—	—	—	—	Southampton.
—	—	—	—	2	5	4	11	—	—	11	Stranraer.
—	14	14	1	164	402	243	809	—	1	1,053	TOTAL.

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the  
showing the PORTS of

PORT IN IRELAND.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
BELFAST, .	—	5	—	—	5	—	—	—
DUBLIN, .	82	—	—	—	82	102	—	102
TOTAL, .	82	5	—	—	87	102	—	102

RETURN of the NUMBER of ANIMALS EXPORTED from IRELAND to the  
showing the PORTS of DEBARKATION

PORT IN ISLE OF MAN.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
DOUGLAS, .	82	5	—	—	87	102	—	102

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the  
showing the PORTS of

PORT IN IRELAND.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
BELFAST, .	—	—	—	—	—	—	—	—
DUBLIN, .	—	—	—	—	—	—	—	—
TOTAL, .	—	—	—	—	—	—	—	—

RETURN of the NUMBER of ANIMALS IMPORTED into IRELAND from the  
showing the PORTS of EMBARKATION

PORT IN ISLE OF MAN.	CATTLE.					SHEEP.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.
DOUGLAS, .	—	—	—	—	—	—	—	—

ISLE OF MAN during the Three Months ended 30th June, 1916,  
EMBARKATION in IRELAND.

SWINE.			Goats	HORSES.				Mules or Jennets..	Asses.	Total Animals.	PORT IN IRELAND.
Fat.	Stores.	Total.		Stallions	Mares.	Geldings	Total.				
—	234	234	—	—	—	—	—	—	—	239	BELFAST.
—	—	—		—	—	—	—	—	—	184	DUBLIN.
—	234	234	—	—	—	—	—	—	—	423	TOTAL

ISLE OF MAN during the Three Months ended 30th June, 1916.  
in the ISLE OF MAN.

SWINE.			Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	PORT IN ISLE OF MAN.
Fat.	Stores.	Total.		Stallions.	Mares.	Geldings.	Total.				
—	234	234	—	—	—	—	—	—	—	423	DOUGLAS.

ISLE OF MAN during the Three Months ended 30th June, 1916,  
DEBARKATION in IRELAND.

SWINE.			Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	PORT IN IRELAND.
Fat.	Stores.	Total.		Stallions.	Mares.	Geldings.	Total.				
—	—	—	—	—	—	—	—	—	—	—	BELFAST.
—	—	—	—	—	—	—	—	—	—	—	DUBLIN.
—	—	—	—	—	—	—	—	—	—	—	TOTAL.

ISLE OF MAN during the Three Months ended 30th June, 1916,  
in the ISLE OF MAN.

[illegible]

## COASTING AND

RETURN OF THE NUMBER OF ANIMALS SHIPPED to and from Places in  
the Places of Embarkation

IRISH PORTS.	CATTLE.					SHEEP.			SWINE.		
	Fat.	Stores.	Other Cattle.	Calves.	Total.	Sheep.	Lambs.	Total.	Fat.	Stores.	Total.
Cork to Aghada Pier, .	—	—	—	—	—	—	—	—	—	—	—
" to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
" to Spike Island, .	—	—	—	—	—	—	—	—	—	—	—
" to Queenstown, .	—	—	—	—	—	—	—	—	—	—	—
" to Waterford, .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	—	—	—	—	—	—	—	—	—	—
Aghada Pier to Cork, .	—	—	—	—	—	—	—	—	—	—	—
Belfast " .	—	—	—	—	—	—	—	—	—	—	—
Spike Island " .	—	—	—	—	—	—	—	—	—	—	—
Queenstown " .	—	—	—	—	—	—	—	—	—	—	—
Waterford " .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	—	—	—	—	—	—	—	—	—	—
Waterford to Ballyhack, .	—	26	1	69	96	—	—	—	13	—	13
" to Belfast, .	—	67	2	6	75	1	1	2	14	6	20
" to Duncannon .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	93	3	75	171	1	1	2	27	6	33
Ballyhack to Waterford, .	23	86	—	—	109	55	55	110	46	—	46
Dublin to Belfast, .	1	—	—	—	1	—	—	—	—	—	—
Duncannon to Waterford, .	73	23	1	—	97	144	74	218	154	—	154
Kilrush to Limerick, .	—	—	—	—	—	—	—	—	—	—	—
Kildysart " .	—	—	—	—	—	—	—	—	—	—	—
Glin, " .	—	—	—	—	—	—	—	—	—	—	—
Portumna, " .	—	—	—	—	—	—	—	—	—	—	—
Tarbert, " .	—	—	—	—	—	—	—	—	—	—	—
Kilkee, " .	—	—	—	—	—	—	—	—	—	—	—
Total, .	—	—	—	—	—	—	—	—	—	—	—
Millford to Portrush, .	—	—	—	—	—	—	—	—	—	—	—
Larne to Belfast, .	—	—	—	—	—	—	—	—	—	—	—
Londonderry to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Moville to Londonderry, .	—	—	—	—	—	—	—	—	1	—	1
Ballina to Sligo, .	—	—	—	—	—	—	—	—	—	—	—
Belmullet " .	2	—	—	5	7	—	—	—	258	—	258
Westport " .	—	—	—	—	—	—	—	—	—	—	—
Total, .	2	—	—	5	7	—	—	—	258	—	258
Sligo to Belmullet, .	—	—	—	—	—	—	—	—	—	—	—
Millford to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Mulroy to Portrush, .	—	—	—	—	—	—	—	—	—	—	—
Dublin to Waterford, .	—	—	—	—	—	—	—	—	—	—	—
Leffbeg to Mulroy, .	—	—	—	—	—	—	—	—	—	—	—
Total, .	99	202	4	80	385	200	130	330	486	6	492

## INLAND NAVIGATION.

Ireland during the Three Months ended 30TH JUNE, 1916, showing  
and Debarkation

Goats.	HORSES.				Mules or Jennets.	Asses.	Total Animals.	IRISH PORTS.
	Stallions.	Mares.	Geldings.	Total.				
—	—	—	—	—	—	—	—	Cork to Aghada Pier.
—	—	—	—	—	—	—	—	" to Belfast.
—	—	—	—	—	—	—	—	" to Spike Island.
—	—	—	—	—	—	—	—	" to Queenstown.
—	—	—	—	—	—	—	—	" to Waterford.
—	—	—	—	—	—	—	—	Total.
—	—	—	—	—	—	—	—	Aghada Pier to Cork.
—	—	—	—	—	—	—	—	Belfast " "
—	—	—	—	—	—	—	—	Spike Island " "
—	—	—	—	—	—	—	—	Queenstown " "
—	—	—	—	—	—	—	—	Waterford " "
—	—	—	—	—	—	—	—	Total.
—	—	—	—	—	—	—	109	Waterford to Ballyhack.
—	—	—	—	—	—	—	—	" to Belfast.
—	—	—	—	—	—	2	99	" to Duncannon.
—	—	—	—	—	—	2	208	Total.
—	—	—	—	—	—	—	265	Ballyhack to Waterford.
—	—	—	—	—	—	—	1	Dublin to Belfast.
—	—	—	—	—	—	—	469	Duncannon to Waterford.
—	—	—	—	—	—	—	—	Kilrush to Limerick.
—	—	—	—	—	—	—	—	Kildysart " "
—	—	—	—	—	—	—	—	Glin " "
—	—	—	—	—	—	—	—	Portumna " "
—	—	—	—	—	—	—	—	Tarbert " "
—	—	—	—	—	—	—	—	Kilkee " "
—	—	—	—	—	—	—	—	Total.
—	—	—	—	—	—	—	—	Milford to Portrush.
—	—	—	—	—	—	—	—	Larne to Belfast.
—	—	—	—	—	—	—	—	Londonderry to Mulroy.
—	—	—	—	—	—	—	1	Moville to Londonderry.
—	—	—	—	—	—	—	—	Ballina to Sligo.
—	—	—	—	—	—	—	265	Belmullet " "
—	—	—	—	—	—	—	—	Westport " "
—	—	—	—	—	—	—	265	Total.
—	—	—	—	—	—	—	—	Sligo to Belmullet.
—	—	—	—	—	—	—	—	Milford to Mulroy.
—	—	—	—	—	—	—	—	Mulroy to Portrush.
—	—	—	—	—	—	—	—	Dublin to Waterford.
—	—	—	—	—	—	—	—	Lettbeg to Mulroy.
—	—	—	—	—	—	2	1,299	Total.

ACCOUNT showing the QUANTITIES of certain kinds of AGRICULTURAL  
into Ireland during each WEEK

ARTICLES	WEEK ENDED				
	1st April	8th April	15th April	22nd April	29th April
ANIMALS LIVING—					
Horses, . . . . No.	—	—	—	—	—
FRESH MEAT—					
Beef (including refrigerated and frozen), . . . cwt.	—	—	—	—	—
Mutton, . . . . "	—	—	—	—	—
Pork, . . . . "	—	—	—	—	—
Unenumerated . . . "	—	—	—	—	—
SALTED OR PRESERVED MEAT—					
Bacon, . . . . cwt.	—	—	—	—	—
Beef, . . . . "	—	—	—	—	—
Hams, . . . . "	—	—	—	—	—
Pork, . . . . "	—	—	—	—	—
Meat, unenumerated, Salted "	—	—	—	—	—
Meat, preserved otherwise than by salting (including tinned and canned), . . . cwt.	—	—	—	—	—
DAIRY PRODUCE AND SUBSTITUTES—					
Butter, . . . . cwt.	—	—	—	—	—
Margarine, . . . . "	—	—	—	—	—
Cheese, . . . . "	—	—	—	—	—
Milk, Condensed, . . . "	33	—	—	—	—
" Cream, . . . . "	—	—	—	—	—
" Preserved, other kinds "	—	—	—	—	—
Eggs, . . . . gt. hunds.	—	—	—	—	—
LARD, . . . . cwt.	—	—	—	—	—
CORN, GRAIN, MEAL AND FLOUR—					
Wheat, . . . . cwt.	72,100	177,700	25,700	308,900	—
Wheat Meal and Flour, . . "	24,700	37,900	21,400	19,200	—
Barley, . . . . "	—	—	—	4,300	—
Oats, . . . . "	—	—	—	—	—
Peas, . . . . "	—	—	—	—	—
Beans, . . . . "	—	—	—	—	—
Maize, or Indian Corn, . . "	—	—	—	—	—
FRUIT, RAW—					
Apples, . . . . "	—	—	—	—	—
Bananas, . . . . bunches	—	—	—	—	—
Currants, . . . . cwt.	—	—	—	—	—
Gooseberries, . . . . "	—	—	—	—	—
Pears, . . . . "	—	—	—	—	—
Plums, . . . . "	—	—	—	—	—
Grapes, . . . . "	—	—	—	—	—
Lemons, . . . . "	—	—	—	—	—
Oranges, . . . . "	—	—	—	—	—
Strawberries, . . . . "	—	—	—	—	—
Unenumerated, . . . . "	—	—	—	—	—
HAY, . . . . tons,	—	—	—	—	—
STRAW, . . . . "	—	—	—	—	—
MOSS LITTER, . . . . "	—	—	—	—	—
HOPS, . . . . cwt.	—	—	—	—	—
VEGETABLES, RAW—					
Onions, . . . . bushels,	—	—	—	—	—
Potatoes, . . . . cwt.	—	—	—	—	—
Tomatoes, . . . . "	—	—	—	—	—
Unenumerated, . . . value £	—	—	—	—	—
VEGETABLES, DRIED, . . cwt.	—	—	—	—	—
Preserved by Canning, . . "	—	—	—	—	—
POULTRY AND GAME, . . value £	—	—	—	—	—

\* This Table is confined to the Imports of certain kinds of Agricultural Produce into a request from this Department kindly consented to separate the Irish Imports (direct) form of Weekly Returns.

PRODUCE imported direct (i.e., from the Colonies and Foreign Countries)  
April, May, and June, 1916.\*

[illegible]

Ireland from the Colonies and Foreign Countries. The Board of Customs have in answer from those of the United Kingdom, and to supply this Department with them in the

Statistics and Intelligence Branch,  
Department of Agriculture  
and Technical Instruction for Ireland.



## DISEASES OF ANIMALS IN IRELAND.

NUMBER OF OUTBREAKS of SWINE FEVER, and NUMBER of SWINE returned as having been SLAUGHTERED in Ireland, under the Diseases of Animals Act of 1894, in the undermentioned period, by Order of the Department.

Quarter ended	SWINE FEVER.	
	Outbreaks confirmed.	Swine Slaughtered as Diseased or as having been Exposed to Infection.
30th June, 1916, . . . .	87	574

NUMBER of OUTBREAKS reported as having taken place, and NUMBER of ANIMALS returned as having been Attacked by ANTHRAX, GLANDERS and FOOT AND MOUTH DISEASE in Ireland in the undermentioned period.

Quarter ended	ANTHRAX.		GLANDERS (including Farcy).		Foot and Mouth Disease.	
	Outbreaks Reported.	Animals Attacked.	Outbreaks Reported.	Animals Attacked.	Outbreaks Reported.	Animals Attacked.
30th June, 1916,	I	I	—	—	—	—

NUMBER of CASES of RABIES in DOGS in IRELAND during the undermentioned period.

Quarter ended	Number of Cases.
30th June, 1916, . . . . .	—

NUMBER of OUTBREAKS reported as having taken place, and NUMBER of ANIMALS returned as having been attacked by SHEEP-SCAB and PARASITIC-MANGE in Ireland in the undermentioned period.

Quarter ended	SHEEP-SCAB.		PARASITIC-MANGE.	
	Outbreaks Reported.	Sheep Attacked.	Outbreaks Reported.	Animals Attacked.
30th June, 1916,	46	690	11	15

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